FLIGHT & The AIRCRAFT ENGINEER.

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Founder and Editor: STANLEY SPOONER.

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NOTICE OF REMOVAL.
The Offices—Editorial and Advertisement—of "FLIGHT and The Aircraft Engineer" are now at
36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
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EDITORIAL COMMENT.

"Newspapers are an essential part of our war organisation."— (*Sir Auckland Geddes, Minister of National Service*).

BY an Order in Council issued during the closing days of the old year, His Majesty has given effect to the Air Force Act in setting forth the manner in which members of the Air Council are to be appointed and the allocation of their several duties. In its constitution the Air Council, as was generally expected, closely follows the organisation of the Board of Admiralty. It is to consist of nine principal members, exclusive of the President, who is given the standing of a Principal Secretary of State. There is a Chief of the Air Staff, assisted by a Deputy Chief; a Master-General of Personnel; a Controller-General of Equipment; a Director-General of Aircraft Production, who will be appointed and work under the Ministry of Munitions; an Administrator of Works and Buildings; and a Parliamentary Under-Secretary of State, who will sit in the Commons when the Secretary of State is a peer, and in the Upper House when his chief is a commoner. In addition, the Order provides for "two additional members," whose duties are not, in the meantime, specified. The Order also mentions an Inspector-General of the Air Force, but this appointment, for some reason which seems obscure, does not appear in the list of members of the Air Council.

The Constitution of the Air Council.

It is noticeable that neither the Admiralty nor the Army Council are represented on the Air Council, so it will be appreciated that at long last we have what has been agitated for—a real Air Service entirely apart from the older fighting services and in no sense the mere maid-of-all-work to either or both. That, it hardly needs saying, does not mean that the Air Force will not work whole-heartedly in unison with the Navy and Army. On the contrary, the new order of things will undoubtedly lead to much better co-ordination of effort, while it leaves those who are responsible for building up an unchallengable air supremacy free to work out that development, untrammelled by the control of Boards and bodies to whom the Air Services are merely a side-issue of another and older service.

We believe the outline of the composition of the new Air Council will meet the approval of the country as a whole, and particularly of that section of the public which has made the study of the Air Services and their development its own. There is an elasticity about it that spells success and efficiency, and is the more welcome because none can forecast with any degree of certainty the exact line of development which will be followed by the Air Service in the years to come. To have given the country an Air Council analogous to, say, the Board of Trade, would have been to defeat the whole object of the drastic alteration which has now been made in the composition and control of the Air Force—to give it its new and official name. It would have been simply deadly to have started the new venture on its career hide-bound by the methods of the older school of Government departments. Fortunately, a wide vision has been preserved, and we are presented with an Air Council which, in theory at any rate, leaves nothing to be desired from any single angle of view from which we regard it. In a word, it is difficult to see how the initial composition of the Council could be bettered.

It will be as well at this juncture if we refrain from entertaining the belief that the new order of things will immediately produce great results in the way of instant growth of aerial ascendency, which is to be measured by an overwhelming air offensive. That will come when the time is ripe and when the great aerial fleet promised by America is ready to make its weight felt in the operations which are due to commence with the break-up of winter on the Western front. In any case these things are of gradual growth and not of instant creation. Moreover, there are other considerations of vital weight to be taken into account. While we are doing everything possible to increase our production of aircraft, we cannot lose sight of the fact that the Navy is and will remain our first line of defence, and our only protection against invasion by the enemy. That being so, it follows of necessity that the Navy must have the first call on all our resources, material and manufacturing. Then, the people of these islands must be fed, and to feed them we must maintain our mercantile fleet and strain every nerve and sinew to replace the tonnage sunk by the enemy's submarines. Again, we have to provide for the needs of an army of more rather than less than five millions, of whom the greater proportion are overseas and absorb immense tonnage for supply. As if that were not enough, most of our Allies look to us for essential supplies of munitions, equipment and assistance in their food and supply problems. There is an irreducible minimum in all these things, and if we fall below that minimum we cannot be said to be doing our full share towards winning the war and crushing Prussian despotism. It is when we have passed the minimum of which we have spoken that we are able to visualise our surplus resources—there are no surplus resources as a matter of fact, but we use the term in default of a better—and to allocate them to this or that service of urgency. Admittedly, the provision of a preponderating Air Force is one of those services of urgency, and must come first in the appropriation of the surplus resources to which we have alluded, but in discussing Air Force needs we must beware of the habit of exaggeration which leads even the best-balanced minds to think that nothing else matters but its own immediate interests. We believe that the Air Council is the ideal body for which we have been praying these years past. We also believe in Lord Rothermere as its President, and we whole-heartedly approve his choice of instruments so far as that choice has been made known—but we do not invite disappointment by expecting miracles. We shall need all our patience, all our stoicism, in the critical months that lie before us.

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A New Year Scandal.

We have received from a valued correspondent a letter, written on official paper and signed by a senior officer of the R.F.C., which, were it not for the evidence of our eyes, we might have hesitated to believe could have been written in the closing days of 1917, when we are all begged and implored to do our level best to "get on with the war." The letter relates to a large—a very large—engineering factory in Scotland and reads as follows :—

"Please note that Messrs. . . . works will be closed for the . . . holidays from December 29th, 1917, to January 7th, 1918. Prior to closing the whole of Messrs. . . . stock of aeroplane parts will be cleared out against standing orders so that no deliveries can be made until the factory reopens. During the above-mentioned time there will be no one in attendance either in the office or in the factory, and no letters or telegrams will be opened until the works start again on the 7th January, hence there will be no possibility of getting any . . . parts during the above-mentioned time."

We regret deeply that this letter was not sent to us until after Christmas, so there was no opportunity of sending it on to the Air Council for action or comment. We do not know who was responsible for the complete closing down of one of the most important factories in the country for the best part of a fortnight, but we should certainly like to know, as we should further like to know what view is taken of it by Lord Rothermere and the Council. Here we are, with the most critical six months of the war before us, when we are being told that we want aircraft and yet more aircraft to make us safe, and the way we set about getting increased production is to close down important factories "for the holidays," not for a mere two or three days, but for nearly two weeks !

There have been strikes and industrial unrest which have militated against production, and we have not hesitated to speak plainly to those who have engineered and taken part in them. We have condemned them in unmeasured terms as being slackers and deliberate traitors to their country—which is the view taken by every decent citizen. And then comes a case like this, in which, apparently with official connivance if not with official approval, we have a virtual strike of a fortnight in a huge factory concerned in aeroplane production—for "the holidays !" Really we are at a loss to find words in which to express our thoughts without going beyond the limits of decent language. The more so do we feel that way because we have some reason to think that not only does the letter we have quoted apply to a single factory, but was of fairly general application over one of the busiest manufacturing districts in the country. When these are our methods, is it any wonder that the war seems interminable ?

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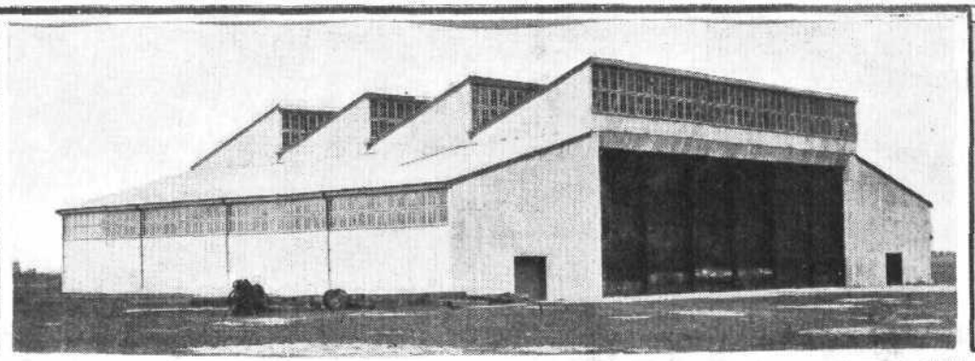
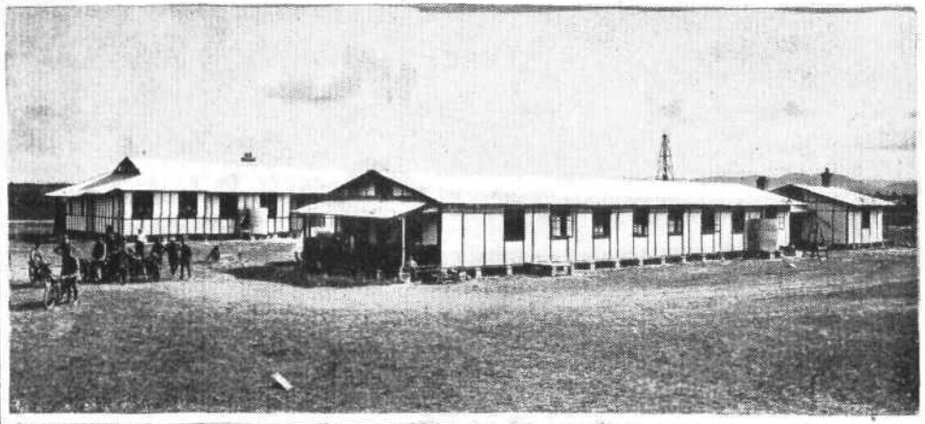
Germany and Air Raids.

It is doubtful if we shall ever be able to properly understand the mental attitude of the Hun—supposing we desire to know more about him than we do. Apparently the German authorities are not satisfied with the moral and mental effect on their own people of the policy of aerial frightfulness pursued against England. In fact, it would almost appear that the enthusiasm engendered among the Hun populations by the repeated complete destruction of London is no greater than the adverse moral effect on our own people produced by attack from the air. In a word, the Hun has been so fed with lying stories of destruction and panic caused among the British populace, stories that he now knows to be false, that he has assumed an air of boredom and scepticism which is worrying his governors mightily.

When Zeppelin raids were the fashion, the Wolff Bureau was wont to send out to the German Press long, flamboyant and lying accounts of the doings of the raiders over British towns, together with strict official directions as to the line of comment to be followed. These directions were carefully observed, as we know from the contemporary records of the Hun newspapers, and all Germany was thrown into a very hysteria of delight at the shattering blows dealt to its most hated enemy. But later, when the

THE STATE AVIATION SCHOOL AT RICHMOND, SYDNEY, N.S.W. ~





AT THE STATE AVIATION SCHOOL, RICHMOND, N.S.W.—Top photo.: the hangars. Centre: the quarters of staff and pupils. Below: some of the pupils, with Chief Instructor Stutt in centre, in front of the 90 h.p. Curtiss School machine. New South Wales was very early alive to the important part which aircraft would perform in the present war, and not only did the Government of that State establish a school of aviation for the training of pilots, but there has been a continuous movement for the presentation of battleplanes to the Empire, thirty-eight machines of this kind having been presented by New South Wales to the Imperial Government.

truth became known and the Hun realised that there was still a London—to say nothing of a few other quite considerable British cities—standing, and that for all the material and moral effect produced by this form of frightfulness the Zeppelin might as well have been kept at home to give joy-rides to war-weary Huns, there came a sort of revulsion of feeling and attitude. Now the German Press faithfully follows directions in so far as the printing of official versions of air raids is concerned, but of comment there is seldom a word. This is not at all in accordance with the wishes of German officialdom, which quite naturally desires to make the most of its frightfulness. In its issue of December 15th, the *Lokalanzeiger*, which is one of the leading journals of Berlin, printed an article, which is on the face of it official—or at least officially inspired—entitled "German and English Air Attacks." In it is made the impudent assertion that air raids on open towns were not begun by Germany, but by her enemies, and that while Germany's air raids are always conducted against "military" objectives those of the Allies are essentially against civilian populations! By process of altogether irrelevant argument, the article deduces that poor Germany is engaged in a purely defensive war against an unscrupulous but happily feeble enemy! In the end it seems that the purpose of the article is to side-track the implication that the British Government is willing to abandon raids on open towns if Germany will agree to do the same—and keep her bargain. The article concludes :—

"The proposal is so skilful, and at the same time so cunning, that there is only one description for it; it is thoroughly English. We have learnt to understand England's view of true humanity, and England's regard for promises. England is soft, conciliatory, and full of Christian charity as long as she lacks the means and the opportunity to strike; she is ruthless, violent, terrible when time and circumstances permit of a blow. That is England's political creed. England began the starvation war against Germany's women and children long before Germany began the air campaign against England's armaments (*sic*).

"Britain would not have cried out so loud if our blows had not been so successful. The English airmen may come and attempt afresh their ruthless attacks on women and children; their atrocities will make us not soft, but hard. Our defences will not sleep. Our answer will be—two blows for one."

Assuming that these are the views of official Germany, as undoubtedly they are, it is quite clear that it is only a waste of time to talk about coming to any understanding on the subject of war against civilian populations. General Ludendorff has declared that this is a war of nations and that the "civilian population is as much a mark for the enemy's bombs as the fighting man." That is certainly not a doctrine we were prepared to accept before the war, nor is it any more palatable to us after three-and-a-half years of fighting against the most unscrupulous enemy we have ever had to tackle. It is contrary to all the usages of international law, and is opposed to all the decent feelings upon which civilisation has hitherto prided itself. It is immoral, but because it is immoral it must be defeated, and if it is only to be defeated by bringing home to the originators of frightfulness that it does not pay, then so be it. We cannot afford, for the sake of the generations that come after us no less than for our own, to allow these breaches of international law and decency to go unpunished. It may be unfortunate that the way in which they can be adequately punished is by the application of the Mosaic law of "an eye for an eye," but, unfortunate or not, it has got to be done and will be done, in spite of all the squealings of the Hun, who dreads nothing so much as being dosed with his own medicine.

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Our Own Policy of Reprisals.

Lord Rothermere has told us that the Air Council is whole-heartedly in favour of reprisals, and that it has reached the conclusion that "it is our duty to avenge the murder of our women and children. For our own part, we have almost come to the pass at which we should be content to accept Lord Rothermere's code of revenge, and to place our policy of counter raids on no higher a plane than that of avenging the murders of our defenceless civilians. But we think the matter goes far beyond that. In the first place, the duty is laid upon our authorities of defending our shores, and if that can only be done—as we believe to be the case—by raiding the enemy's towns from the air until he cries for mercy, then let us raid them as often and as heavily as need be. We shall in the course of these raids undoubtedly kill and injure German civilians. We regret the necessity, but we cannot get away from the fact that the necessity has been forced upon us by the prior action of an enemy who has adopted frightfulness as his creed in the belief that he was the only one with a stomach for it. It has taken us long enough to learn the lesson, but we have learnt it now, and all we have to say is "Let there be raids!"

And at last we are assured that there *will* be raids, and that they will be continued in ever-growing intensity until, as in the case of poison gas, the Hun will regret nothing so much as his own outrages on international decency and the usages of civilised war. The recent raid on Mannheim—in which, by the way, the Arch-Hun himself seems to have unfortunately escaped by an hour or so—is only a foretaste of what is in store for the apostles of frightfulness. Let us hope they will like it when it bursts on their heads in its full measure.

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The Dangers of State Control.

From time to time we have sounded a note of warning regarding the measure of State control to which the aircraft industry is being gradually and insidiously subjected. Let us make it quite clear that we do not mean by this that measure of control imposed by the Controlled Establishments Orders, or any similar regulations which we, like most sensible people, regard as being essential for the time being to the successful conduct of the war. What we have in mind is something quite different to that—it is nothing less than the nationalisation of the aircraft industry, not only now but after the war. We do not intend at the moment to give chapter and verse of all that has come to our knowledge in connection with the question, but we do say that a most careful watch will have to be kept on matters, else we may wake up one morning and find that there is no industry—only another Government Department.

We have, on several previous occasions, given at length a number of reasons why the nationalisation of aircraft manufacture would be a totally mistaken line of policy, apart altogether from questions of what is due to the people who have developed the industry and have to the full assisted to tide the Empire over a time of critical stress. Therefore, we do not propose at the moment to repeat or to elaborate those arguments, the more so as we imagine they are not subject

to controversy, except from the point of view of the new bureaucracy which has cast its covetous eyes on the industry as a means for perpetuating its well-salaried appointments.

Lest there should be some who regard our warnings as in the nature of a cry of "Wolf!" when there is no wolf, let us step aside for a moment and see what is happening in other directions and to other industries upon which bureaucracy has, under the excuse of war necessity, got its claws. Within the past month or six weeks we have had no fewer than four separate and distinct examples of what happens when an industry falls completely under bureaucratic control. Taking them in their order these are: (1) the judgment of the Courts in the case of the China Mutual Shipping Company *v.* the Shipping Controller; (2) The Coal Mines Control Act; (3) the establishment of the new national shipyards; and (4) the Imports and Exports Temporary Control Bill.

The judgment in the case of (1) undoubtedly leaves one with the impression that the Shipping Controller not only exceeded his legal powers, but acted in a most arbitrary and high-handed manner. As a matter of fact, he practically assumed the status of a dictator who is above the law, or to whose desires the law must be adjusted or made to bend just as he pleases. He had, it is clear, an absolute right to requisition the services of the ships belonging to the China Mutual Co., but that did not content him—he must requisition the services of the owners and their profits as well, a thing he certainly had no legal excuse for doing. Knowing the ways of the new bureaucracy we cannot be less than astonished at his moderation in not claiming the disposal of their souls!

With regard to (2), the Coal Mines Control Act gives to the Coal Controller for the time being power to levy discriminating taxes upon an important industry for purposes of a compensation fund, without a Treasury guarantee and without a vestige of control by the House of Commons. What, we ask, would happen to the Crown if the King were to attempt to put back history a few hundred years and levy taxes how and to what amount he pleased? And yet the right which would be unhesitatingly and uncompromisingly denied to the monarch is vested in a person of whose very name and existence we dare wager the bulk of the people of these islands are profoundly ignorant. Truly, "Free" England is coming to something when a representative Parliament invests this and that Controller of something or other with powers which have not been exercised by the Crown itself for four hundred years!

Then we come to the matter of the new national shipyards. Here again, at the mere instance of a Department, an enormous expenditure is to be undertaken without estimates and without even the formal sanction of Parliament. We have nothing to say as to the necessity of these new yards. It may be essential that they should be laid down—it probably is—but we do say there is the gravest fault to be found with the departure from constitutional usage. It is not as though the enemy could have gained valuable information if estimates had been laid before Parliament. The fact that these yards are to be constructed is common property, and the Germans know as much about it—more—as the British public whose money is to be spent in building them. They are *permanent* works, as opposed to temporary war measures, and the estimates ought of a surety to have been submitted to Parliament for formal sanction at least. The whole attitude of the bureaucrat is that of the distinguished personage who, told at the beginning of the war that the public would not stand a certain course being taken, replied: "The British public stands where I tell it."

When we come to the consideration of (4), we find that the Government is seeking powers to extend the existing State control over imports and exports for three years after the conclusion of peace. That is to say, the whole trade and commerce of the country is to be at the beck and call and under the thumb of a Board of Trade which includes in its membership the Archbishop of Canterbury and the Speaker of the Irish House of Commons! The whole thing is utterly preposterous. That State Control should continue for some period after the war is comprehensible, since there must be an interval of time during which we are, so to speak, handing in our rifles and equipment and getting back into our everyday clothes. But three years! It would inevitably result in the loss of all initiative, and our trade opponents would, before that term expired, have secured a firm grip on the overseas markets of the world. All the great schemes of reorganisation and reconstruction which are in preparation would be wasted and stultified by the blighting influence of bureaucratic control, and long before the end of three years we should find our commercial supremacy gone from us for ever. Fortunately, this measure has not received the sanction of our tame House of Commons yet, and in the meantime a tremendous volume of commercial opinion is growing up against it, so it may be we shall be saved from the catastrophe which would be almost certain to overtake commercial England if the bureaucrats should succeed in their plain design to retain control—and their jobs—indefinitely. When we regard what is taking place all round us in connection with almost every important industry in the country, and when we are aware of things that have happened and are happening in the aircraft industry, we cannot but view the future with the most profound disquiet.

Air Board Technical Department.

THE Secretary of the Air Board has issued the following statement:—

"A reorganisation of the Technical Department, hitherto under the Air Board, has been carried out by which that department has been transferred to the department of the Director-General of Aircraft Production, which is part of the Ministry of Munitions.

"Erroneous inferences having been drawn from the fact that certain officers employed in the Technical Department, as formerly constituted, have been placed, as a consequence of this reorganisation, at the disposal of the Admiralty and War Office, it is notified that the changes in question arose simply from the fact that, under the rearrangement of duties places for the officers in question no longer existed, and did not imply any reflection on the professional or technical qualifications of those officers."

Air Raid Warnings at night.

THE London Commissioner of Police has decided that maroons or sound-bombs shall be fired into the air from certain police stations as air-raid warnings in hours of darkness, when the streets are crowded and must be cleared quickly, but not at hours when the streets are quiet.

These will be in addition to the "Take cover" warning by police whistles.

NEW YEAR HONOURS.

Royal Naval Air Service.

THE King has been pleased to give directions for the following appointment to the Most Distinguished Order of Saint Michael and Saint George, in recognition of valuable services rendered during the war :—

C.M.G.

Captain C. L. Lambe, R.N., D.S.O.

The King has been pleased to give orders for the appointment of the following officers to be Companions of the Distinguished Service Order, in recognition of their services in the prosecution of the war :—

Wing-Commander P. F. M. Fellowes, R.N. ; Flight-Commander A. M. Shook, D.S.C., R.N.A.S.

The following promotions have been made to date December 31st, 1917 :—

Wing-Commanders to be Wing-Captains.

Charles R. Samson, D.S.O. ; Arthur M. Longmore ; Roland C. S. Hunt ; Robert H. Clark-Hall.

Wing-Commander to be Acting Wing-Captain.

John D. Mackworth.

Squadron-Commanders to be Wing-Commanders.

James L. Travers ; Arthur C. Barnby ; Cecil F. Kilner, D.S.O. ; Douglas H. Hyde-Thomson ; William C. Hicks ; Charles R. F. Noyes ; Charles H. K. Edmonds, D.S.O. ; Alexander D. Cunningham ; Peregrine F. M. Fellowes (acting Wing-Commander) ; Charles D. Breese ; Geoffrey R. Bromet, D.S.O. ; Harry Delacombe (acting Wing-Commander) (T.) ; Henry R. Busteed ; The Master of Sempill (T.) ; Redford H. Mulock, D.S.O.

Squadron-Commanders to be Acting Wing-Commanders.

Francis E. T. Hewlett ; Ivor G. V. Fowler ; Richard E. C. Peirse, D.S.O. ; James W. O. Dalgleish ; Tom D. Mackie (T.) ; John Dunville (T.) ; Charles F. Pollock.

Flight-Commanders to be Squadron-Commanders.

William G. Sitwell ; Ronald H. Kershaw ; Christopher Draper (acting Squadron-Commander) ; Sidney V. Sippe, D.S.O. (acting Squadron-Commander) (T.) ; Hugh C. Fuller ; James D. Maude ; Conway W. H. Pulford (acting Squadron-Commander) ; Philip L. Holmes, D.S.C. ; Anthony R. Arnold (acting Squadron-Commander) ; Norman S. Douglas ; Irving H. B. Hartford ; Reginald E. Nicoll ; Harold F. Towler ; Harold A. Buss, D.S.C. (T.) ; Hon. Gilbert de St. C. Rollo (T.) ; Edwin R. Moon, D.S.O. (T.) ; Maurice E. A. Wright ; Rupert E. Penny ; John S. Mills, D.S.C. ; Eric J. Hodsoll (acting Squadron-Commander) ; Brian S. Benning ; Roger M. Field ; George F. Breese, D.S.C. ; William L. Welsh (acting Squadron-Commander) ; Ivor Fraser (T.) ; Theodore D. Hallam. D.S.C. (T.) ; Benjamin Travers (T.) ; James C. P. Wood ; Eustace F. Moyes ; Arthur Q. Cooper, D.S.C. (T.) ; Frederick W. Gamwell ; Lawrence P. Openshaw ; Cuthbert E. Brisley (T.) ; William G. Moore, D.S.C. ; Thomas V. Lister ; James E. B. Maclean, D.S.C. ; Frederick W. Lucas ; Guy W. Cranfield (T.) ; William C. Michie (T.) ; Reginald B. B. Colmore ; Bertram C. Bell, D.S.O., D.S.C. (T.) ; John R. Davison (T.) ; Bruno P. H. de Roeper (T.) ; Ernest W. Norton, D.S.C. (acting Squadron-Commander) ; Stanley J. Goble, D.S.O., D.S.C. (acting Squadron-Commander) (T.) ; Frederick E. Sandford (T.) ; Kenneth C. Buss (T.).

Flight-Commanders to be Acting Squadron-Commanders.

William H. Wilson ; George C. Colmore ; Basil Binyon ; Edward J. C. Roberts ; William H. Watt (T.).

Acting Flight-Commander Confirmed in Rank and Promoted to Acting Squadron-Commander.

Percival Owen.

Flight-Lieutenants to be Flight-Commanders.

Frederick W. Merriam (acting Flight-Commander) (T.) ; William H. Elliot (acting Flight-Commander) (T.) ; Guy W. Price (acting Flight-Commander) ; Ralph S. Sorley ; Gilbert F. Smylie, D.S.C. ; William Peer Groves (acting Flight-Commander) (T.) ; Harry R. Hopperton ; Grahame Donald ; Francis J. E. Feeny (acting Flight-Commander) ; John Forgan Potts (acting Flight-Commander) ; John P. Coleman ; Ernest L. Johnston ; Frank Cleary ; Edward A. de L. de Ville (acting Flight-Commander) (T.) ; George A. Cox ; Charles F. Latimer (acting Flight-Commander) ; Stanley B. Joyce ; George G. Ommanney ; Louis C. Keeble (acting Flight-Commander) ; Henry S. Neville (T.) ; Maximilian H. Spencer (T.) ; Arthur D. W. Allen, D.S.C. (acting Flight-Commander) (T.) ; Frank U. Y. Weldon (T.) ; Thomas P. Y. Moore ; Percy E. Maitland ; Patrick G. N. Ommanney ; Wilfred Underhill ; Archibald H. Wann ; Thomas W. Elmhirst ; William P. C. Chambers ; Ivo C. Little ; John A. Barron ; Osborne A. Butcher, D.S.C. (acting Flight-Commander) (T.) ; David Gill (acting Flight-Commander) ; Basil E. P. Gregg (acting Flight-Commander) (T.) ; Henry McClelland, D.C.S. ; Frank S. McGill (T.) ; Noel Keeble, D.S.C. (acting Flight-Commander) (T.) ; Malcolm, D.S.C. (acting Flight-Commander) (T.) ; Malcolm Bartlett (T.) ; William M. Tait (T.) ; John E. M. Pritchard (T.) ; Arnold H. Sandwell (T.) ; Walter B. Lawson (acting Flight-Commander) (T.) ; Arthur N. Gallehawk (T.) ; Francis E. P. Barrington (acting Flight-Commander) (T.) ; Frederic W. Walker, D.S.C. (T.) ; William Man (T.) ; Norman G. Stewart-Dawson, D.S.C. (acting Flight-Commander) (T.) ; Frederick D. Till (T.) ; Leonard G. Scott (T.) ; Henry G. Holden, D.S.C. (acting Flight-Commander) (T.) ; Cecil H. Darley, D.S.C. (acting Flight-Commander) (T.) ; Frederick M. Fox (T.) ; Edward R. Grange, D.S.C. (T.) ; John Robinson (T.) ; George Thom (acting Flight-Commander) (T.) ; John K. Waugh (acting Flight-Commander) (T.) ; Harold S. Kerby, D.S.C. ; James S. Browne (T.) ; Charles W. Scott (T.) ; Eric P. Hicks (T.) ; Alan M. Waistell ; Trevoir R. Hackman (T.) ; Richard G. Gardner, D.S.C. (T.) ; Bert S. Wemp (acting Flight-Commander) (T.) ; John F. Jones, D.S.C. (acting Flight-Commander) (T.) ; Ambrose B. Shearer (T.) ; Philip S. Fisher, D.S.O., D.S.C. (acting Flight-Commander) (T.) ; Stearne T. Edwards, D.S.C. (T.) ; Kenneth G. Macdonald (T.) ; Thomas H. Newton, D.S.C. (T.) ; Albert Durston (acting Flight-Commander) (T.) ; Robert A. Little, D.S.O., D.S.C. (acting Flight-Commander) (T.) ; Charles H. B. Jenner-Parson (T.) ; John O. Galpin, D.S.C. (T.) ; Fred. C. Armstrong, D.S.C. (acting Flight-Commander) (T.) ; Ronald F. Redpath (T.) ; Robert Leckie, D.S.C. (T.) ; Basil D. Hobbs, D.S.O., D.S.C. (T.) ; Raymond Collishaw, D.S.O., D.S.C. (acting Flight-Commander) (T.) ; Joseph S. T. Fall, D.S.C. (acting Flight-Commander) (T.) ; William M. Alexander, D.S.C. (acting Flight-Commander) (T.).

Flight Sub-Lieutenants to be Flight-Lieutenants.

Reginald Chambers ; Thomas C. Angus (T.) ; Lionel C. W. Trend (T.) ; William E. McConnell (T.) ; Rene J. M. de St. Leger (T.) ; Kenneth G. Boyd (T.) ; Douglas W Gray (T.) ; Albert H. V. Fletcher (T.) ; Claver V. Bessette (T.) ; Percy C. C. Passman (T.) ; William O. F. Harding (T.) ; David D Findlay (T.) ; Arthur W. Williams (acting Flight-Lieutenant). (T.) ; Edward E. Barnard (T.) ; George H. D. Gossip (T.) ; Harry L. Nunn (T.) ; Henry J. Bath (T.) ; Hugh A. Wilson (T.) ; Wellington C. Ault (T.) ; William V. Simons (T.) ; Oscar S. Stiles (T.) ; Bertie A. Millson (T.) ; Edwin A. Power (T.) ; Eric J. Crisp (T.) ; William D. Jackson (T.) ; Robert B. Frame (T.) ; Peter H. Martin (acting Flight-Lieutenant) (T.) ; Frederick E. Fraser, D.S.C. (T.) ; Harold J. Roach (T.) ; Gerald M. Part (T.) ; Ernest P. Will (T.) ; Edgar A. Bolton (T.) ; Stanley F. Ingram (T.) ; William J. de Salis, D.S.C. (T.) ; John S. Wright, D.S.C. (T.) ; Edward W. Keesey (T.) ; Ernest G. F. Thompson (T.) ; Cecil R. Vaughan (T.) ; George W. Parker (T.) ; Frank H. McMaster (T.) ; Philip H. Mackworth (T.) ; Richard G. Clarke (T.) ; John de C. Paynter (T.) ; Charles A. Narbeth (T.) ; William E. Foster (T.) ; Gerald K. Cooper (T.) ; Harold H. Gonyon (T.) ; Edward E. Maitland-Heriot, D.S.C. (acting Flight-Lieutenant) (T.) ; Clifford Hanson-Abbott (acting Flight-Lieutenant) (T.) ; Frederick V. Branford (T.) ; Trevor W. S. Harris (T.) ; Maurice W. Buckley (T.) ; Edward R. Barker, D.S.C. (T.) ; Lea E. B. Wimbush (T.) ; Geoffrey W. Hemming, D.S.C. (T.) ; Tom C. Trumble (T.) ; Alan G. Bishop (T.) ; Bernard J. W. Brady ; Albert W. Fletcher (T.) ; Charles R. Rischbieth (T.) ; Francis S. G. Lewis (acting Flight-Lieutenant) (T.) ; Philip G. Williams (T.) ; Alan B. Holcroft (T.) ; Edward B. Drake (T.) ; Arthur L. Taylor (T.) ; Leslie V. Kahn (T.) ; Fernley J. Hosking (T.) ; Lord Ossulston (T.) ; David Plaistowe (T.) ; Frederic R. Johnson, D.S.C. (T.) ; Ronald M. Keirstead (acting Flight-Lieutenant) (T.) ; John R. Allan, D.S.C. (T.) ; Edward D. Crundall (T.) ; John M. Turner (T.) ; Charles R. Lupton, D.S.C. (T.) ; Leslie H. Brake (T.) ; Algernon Holland (T.) ; Godfrey E. Wildman-Lushington (T.) ; Leonard H. Cockey (T.) ; Robert B. Freeland (T.) ; Geoffrey P. C. Greene (acting Flight-Lieutenant) (T.) ; John Hodson (T.) ; Aubrey M. Tidey (T.) ; Arthur T. Barker (T.) ; John Gamon (T.) ; Arthur W. Kay (T.) ; Cyril F. Brewerton (acting Flight-Lieutenant) (T.) ; Hippolyte F. Delarue (T.) ; George L. Elliott (T.) ; Arnold Adamson (T.) ; Brian R. Millar (T.) ; Thomas A. Gladstone (T.) ; Euan Dickson, D.S.C. (T.) ; Archibald C. Reid (T.) ; Harold M. Morris, D.S.C. (T.) ; Norman C. Harrison (T.) ; Arthur R. Stack (T.) ; Frederic C. Lander (T.) ; Harold H. Booth (T.) ; Wilfred A. Curtis, D.S.C. (acting Flight-Lieutenant) (T.) ; Thomas K. Thyne (T.) ; Rowan H. Daly, D.S.C. (T.) ; Adrian J. B. Tonks (T.) ; Thomas C.

T—for temporary service.

Pattinson (T.) ; Lindsay W. S. Cutler (T.) ; John W. B. Grigson (T.) ; Olive C. Le Boutillier (T.) ; Norman D. Hall (T.) ; Norman M. Scott (acting Flight-Lieutenant) (T.) ; Henry W. Kendall (T.) ; Goodwin H. T. Barnes (T.) ; Cecil J. Clayton (T.) ; Roderick McDonald (T.) ; Hubert C. Lemon (T.) ; Alexander R. Knight (T.) ; Charles E. S. Lusk (T.) ; Arthur C. Burt (acting Flight-Lieutenant) (T.) ; George R. Marshall (acting Flight-Lieutenant) (T.) ; Wilfred R. D. Acland (T.) ; Norman H. Woodhead (T.) ; Harold F. Stackard (T.) ; Philip B. Silk (T.) ; Henry R. de Wilde (T.) ; William L. Jordan, D.S.C. (T.) ; William F. Dickson (T.) ; Francis J. Vincent (acting Flight-Lieutenant) ; Robert M. Stirling (T.) ; Frederick G. Horstmann (T.) ; Charles L. Young, D.S.C. (T.) ; John W. Pinder (T.) ; Francis J. W. Mellersh (T.) ; Ronald Jarman, D.S.C. (T.) ; Stanley W. Rosevear, D.S.C. (T.) ; Ralph E. Carroll (T.) ; Sidney T. Freeman ; John P. Hales (T.) ; Louis D. Bawlf (T.) ; John E. L. Hunter, D.S.C. (T.) ; Oliver W. Redgate (T.) ; Edward M. Knott (T.).

Observer-Lieutenants to be Flight-Observers.

Ronald G. St. John, D.S.C. (T.) ; Vincent Greenwood (T.) ; Hector A. Furniss (T.) ; Russell W. Gow, D.S.O., D.S.C. (T.) ; Eric B. C. Betts, D.S.C. (T.).

Observer Sub-Lieutenants to be Observer-Lieutenants.

Stanley E. Hoblyn (T.) ; Eric G. Hutton (T.) ; Alick C. Stevens (T.) ; Frederick C. F. Walwyn (T.) ; Lewis G. Le B. Croke (T.) ; Thomas H. Piper (T.) ; Robert Redfern (T.) ; Duncan G. McGregor (T.) ; Leonard Ritson (T.) ; Bernard E. Harrison (T.) ; Alan E. Sole (T.) ; William S. Anderson (T.) ; Gilbert G. Speight (T.) ; Robert W. Greenwood (T.).

T—for temporary service.

New Year Honours for R.F.C.

THE King has been pleased to give orders for the following promotion in the Most Honourable Order of the Bath for valuable services rendered in connection with military operations in the field (dated January 1st, 1918) :—

K.C.B. (Military Division).

Major-General H. M. Trenchard, C.B., D.S.O.

The King has been pleased to give directions for the following appointments to the Most Distinguished Order of Saint Michael and Saint George, for services rendered in connection with military operations in the field (dated January 1st, 1918) :—

C.M.G.

Major and Bt. Lieut.-Col. (temp. Brig.-Gen.) T. I. Webb-Bowen, Bed. R.

The King has been pleased to give directions for the following appointments to the Most Distinguished Order of Saint Michael and Saint George, in recognition of valuable services in connection with the war (dated January 1st, 1918) :—

Major and Bt. Lieut.-Col. (temp. Brig.-Gen.) D. Le G. Pitcher, Ind. Army.

The King has been graciously pleased to approve of the following rewards for distinguished service in the field (dated January 1st, 1918) :—

To be Brevet Col.

Lieut.-Col. (temp. Brig.-Gen.) C. E. C. G. Charlton, D.S.O., R.A. ; Major and Bt. Lieut.-Col. (temp. Brig.-Gen.) E. L. Ellington, C.M.G., R.A. ; Lieut.-Col. (temp. Brig.-Gen.) J. F. A. Higgins, D.S.O., R.A.

To be Brevet Lieut.-Col.

Major (temp. Brig.-Gen.) J. H. W. Becke, D.S.O., Notts and Derby R. ; Capt. and Bt. Major (temp. Brig.-Gen.) G. S. Shephard, D.S.O., M.C., R. Fus.

To be Brevet Major.

Capt. R. J. F. Barton, R. Sc. F. and R.F.C. ; Capt. (temp. Lieut.-Col.) E. H. Davidson, M.C., Gor. Hrs. and R.F.C. ; Capt. (temp. Lieut.-Col.) C. L. N. Newall, Ind. Army ; Capt. (temp. Lieut.-Col.) G. F. Pretyman, D.S.O., Som. L.I., attd. R.F.C.

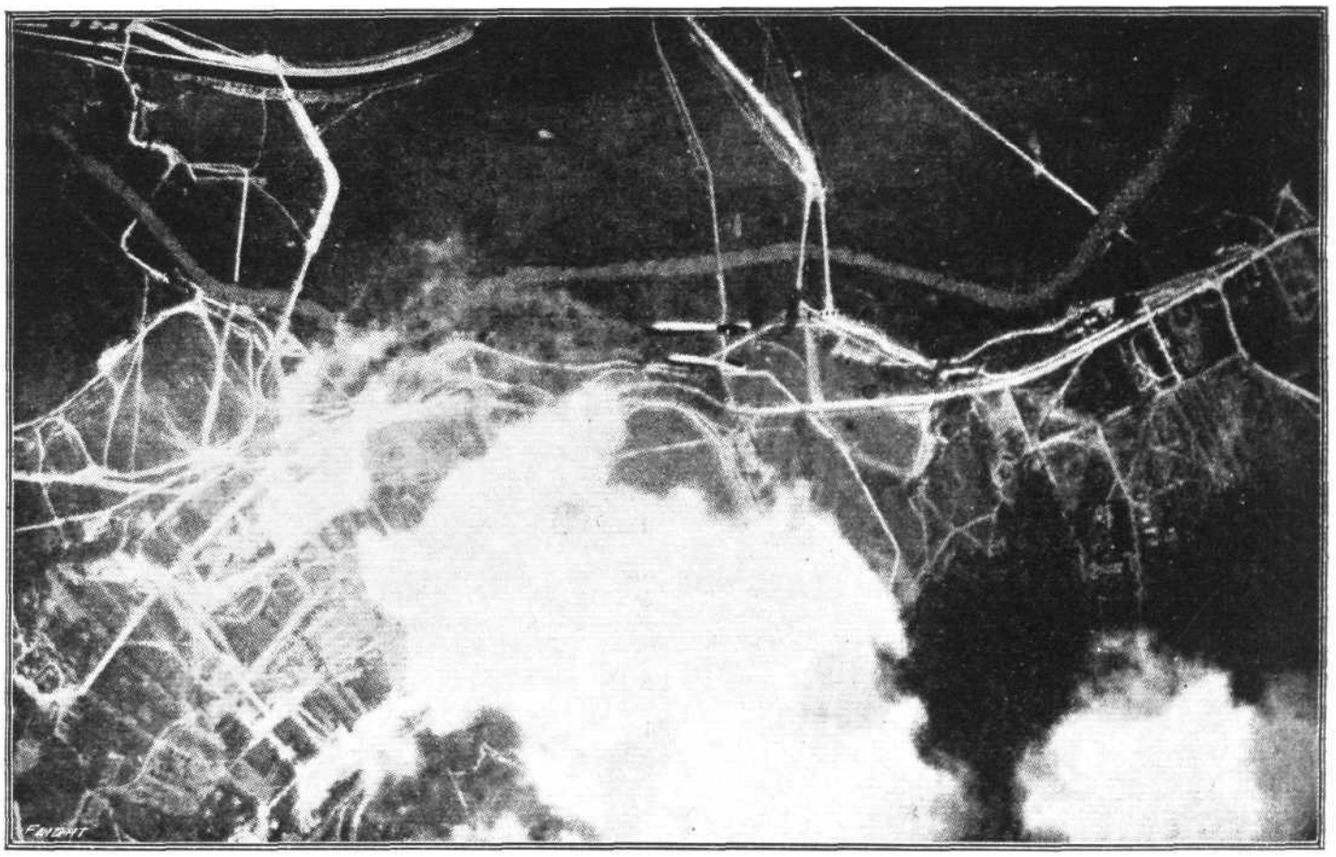
The King has been pleased to approve of the following honours and rewards for valuable services rendered in connection with the war (dated January 1st, 1918) :—

To be Brevet Lieut.-Col.

Major (temp. Lieut.-Col.) A. B. Burdett, D.S.O., Y. and L.R. and R.F.C. ; Major (temp. Brig.-Gen.) H. C. T. Dowding, R.A. and R.F.C. ; Major (temp. Brig.-Gen.) R. E. T. Hogg, C.I.E., I.A. and R.F.C. ; Major (temp. Brig.-Gen.) G. Livingston, C.M.G., London R. and R.F.C.

To be Brevet Major.

Capt. (temp. Lieut.-Col.) U. J. D. Bourke, Ox. and Bucks L.I. and R.F.C. ; Capt. J. F. Dyer, E. Lancs R. and R.F.C. ; Capt. (temp. Lieut.-Col.) B. S. Foster, Hamps. R. and R.F.C. ; Capt. (temp. Lieut.-Col.) A. Huggins, D.S.O., R.F.C. (S.R.) ; Capt. (temp. Brig.-Gen.) F. C. Jenkins, R.F.C. (S.R.) ; Capt. Sir N. R. A. D. Leslie, Bt., Ind. Cav. and R.F.C. ; Capt. G. D. Pidgeon, R.F.C. (S.R.) ; Capt. (temp. Lieut.-Col.) R. R. Smith-Barry, R.F.C. (S.R.)



A REMARKABLE SNAPSHOT.—Two bombs photographed as they were dropping from an aeroplane.

CONSTITUTION OF THE AIR COUNCIL.

IT was announced in the *London Gazette* of December 21st that, acting under the powers conferred by section 8 of the Air Force Act, the King has made an Order in Council, setting forth the constitution of the Air Council. The Order also provides for the manner in which the various members of the Council shall be appointed and for the allocation among them of the business which will have to be dealt with. The text of the Order is as follows :—

1. As from such date as His Majesty may hereafter fix by Order in Council as the date on which the Air Council is to be established, the Air Council shall consist of the following members, that is to say :—

One of His Majesty's Principal Secretaries of State, who shall be President of the Air Council ;
The Chief of the Air Staff ;
The Deputy Chief of the Air Staff ;
The Master General of Personnel ;
The Controller General of Equipment ;
The Director General of Aircraft Production in the Ministry of Munitions ;
The Administrator of Works and Buildings ;
The Parliamentary Under-Secretary of State ;
Two additional Members.

2. Of the members of the Air Council (other than the President) the Chief of the Air Staff, the Deputy Chief of the Air Staff, the Master General of Personnel, the Controller General of Equipment, and the Inspector General of the Air Force, shall be appointed by His Majesty ; the Director General of Aircraft Production shall be appointed by the Minister of Munitions, and the other members of the Air Council shall be appointed by the Secretary of State.

3. The Secretary of State is to be responsible to His Majesty and Parliament for all the business of the Air Council.

All business, other than business which the Secretary of State specially reserves to himself, is to be transacted in the following principal divisions :—

(*a*) The Chief of the Air Staff, the Master General of Personnel, and the Controller General of Equipment to be responsible to the Secretary of State for the administration of so much of the business relating to the organisation, disposition, *personnel*, equipment, armament and maintenance of the Air Force as may be assigned to them or each of them from time to time by the Secretary of State.

(*b*) The Deputy Chief of the Air Staff to be responsible for the administration of so much of the business assigned to the Chief of the Air Staff as may be delegated to him by the Chief of the Air Staff.

(*c*) The Parliamentary Under-Secretary of State to be responsible to the Secretary of State for the finance and contracts of the Air Force, for the acquisition and administration of lands required for the purposes of the Air Force, and for so much of the other business of the Air Council as may be assigned to him from time to time by the Secretary of State.

(*d*) The Administrator of Works and Buildings to be responsible to the Secretary of State for the provision and maintenance of the works and buildings required for the Air Force.

(*e*) The Secretary of the Air Council to be charged with the interior economy of the Department and the preparation of all official communications of the Council, and with such other duties as the Secretary of State may from time to time assign to him.

4. Subject to the foregoing provisions as to the transaction of business in separate divisions, the powers and duties of the Air Council may be exercised and performed by any three of their number, and notwithstanding that any office the holder of which is a member of the Air Council is temporarily vacant.

Aircraft Production.

IT is officially announced that, following the appointment of Sir William Weir as a member of the recently constituted Air Council, and as the Director-General of Aircraft Production in the Ministry of Munitions, the following appointments in the Department of Aircraft Production have been made by the Minister of Munitions :—

Assistant Director-General—Mr. Henry Fowler, C.B.E.
Controller of Supply Department—Lieut.-Colonel W. Alexander, D.S.O.
Controller of Technical Department—Lieut.-Colonel J. G. Weir.

Lands for the Air Ministry.

IT is announced that Sir Howard Frank has been appointed Director-General of Lands for the Air Ministry.

Sir Howard is also Director-General of Lands to the War Office and the Ministry of Munitions. The whole business of the taking over of lands, their acquisition and renting, management, and the compensation payable in respect thereto will thus be under one control for the three Departments—the War Office, the Ministry of Munitions, and the Air Ministry.

New Quarters for the Air Council.

IT was announced on Wednesday that the Government had commandeered the British Museum for office accommodation for the Air Council. The structural alterations are being completed as rapidly as possible, and part of the staff is already installed.

A vigorous protest against the taking over of the buildings has been made by the Trustees.

The French Air Board.

WRITING on December 30th, the Paris correspondent of the *Times* says :—

" The French Air Board silently came into being a fortnight ago, and since then it has been sitting daily, or rather nightly, reorganising the different services and speeding up the construction of machines. Henceforth it will meet thrice weekly.

" The head of the new Air Board, or Higher Council of Aviation, is the Minister for Armaments, assisted by the Under-Secretary of State for Aeronautics, one representative of G.H.Q., and the heads of the various services concerned. A programme of the needs of various types of machines is drawn up by G.H.Q. and transmitted through the Under-Secretary for Aeronautics to the Air Board, which considers it in relation to the available raw material, and whose decision is final and executed without delay."

R.N.A.S. Observer Officers' Uniform.

THE Secretary of the Admiralty announces that it has been decided that officers (other than officers of the Royal Navy, Royal Naval Reserve, Army, or Royal Marines), who are graded as observer officers in the Royal Naval Air Service, shall wear the uniform of their rank in the military branch of the Royal Navy, except that the anchor on buttons, cap-badge, epaulettes, and sword-belt will be replaced by a gilt badge, consisting of an " O " with wings, and shall wear in addition an " O " with wings on each sleeve above the distinction lace, and on each shoulder strap.

The distinction marks of rank on the sleeve and shoulder strap for observer officers will be as follows :—

Observer captain holding the rank of captain in the Royal Navy.—As for a captain in the Royal Navy.

Other observer captains.—As for a commander in the Royal Navy, with the addition of a star above the " O " with wings.

Wing observer.—As for a commander in the Royal Navy.

Squadron observer of eight years' seniority as observer lieutenant, flight observer, and squadron observer.—As for a lieutenant-commander in the Royal Navy.

Squadron observer of less than eight years' seniority as observer lieutenant, flight observer, and squadron observer.—As for a lieutenant in the Royal Navy, with the addition of two stars above the " O " with wings.

Flight observer.—As for a lieutenant in the Royal Navy, with the addition of a star above the " O " with wings.

Observer lieutenant.—As for a lieutenant in the Royal Navy.

Observer sub-lieutenant.—As for a sub lieutenant in the Royal Navy.

Effect need not be given to the change promulgated in the opening paragraph until the articles of uniform require renewal.

Fire Brigade and Air Raids.

IN a New Year's greeting to the London Fire Brigade, Lieutenant-Commander S. Sladen, R.N., the Chief Officer, says : " I cannot let the opportunity pass without expressing my high appreciation of their work during the past year, and the ready and cheerful manner in which they have responded to the extra calls made upon them, due to the air raids on London by enemy aircraft.

" The nerve and resource of the members of the brigade have on occasions been severely taxed, and, in several instances, officers and men have been at work in the open and exposed to the utmost danger from the enemy bombs, but their courage, ability, and fearless devotion to duty have been at all times admirable.

" In the coming year, when similar emergencies will probably again arise, I look forward with confidence to every officer and man maintaining their high reputation."

FLIGHT

THE 260 H.P. MERCEDES AERO ENGINE.

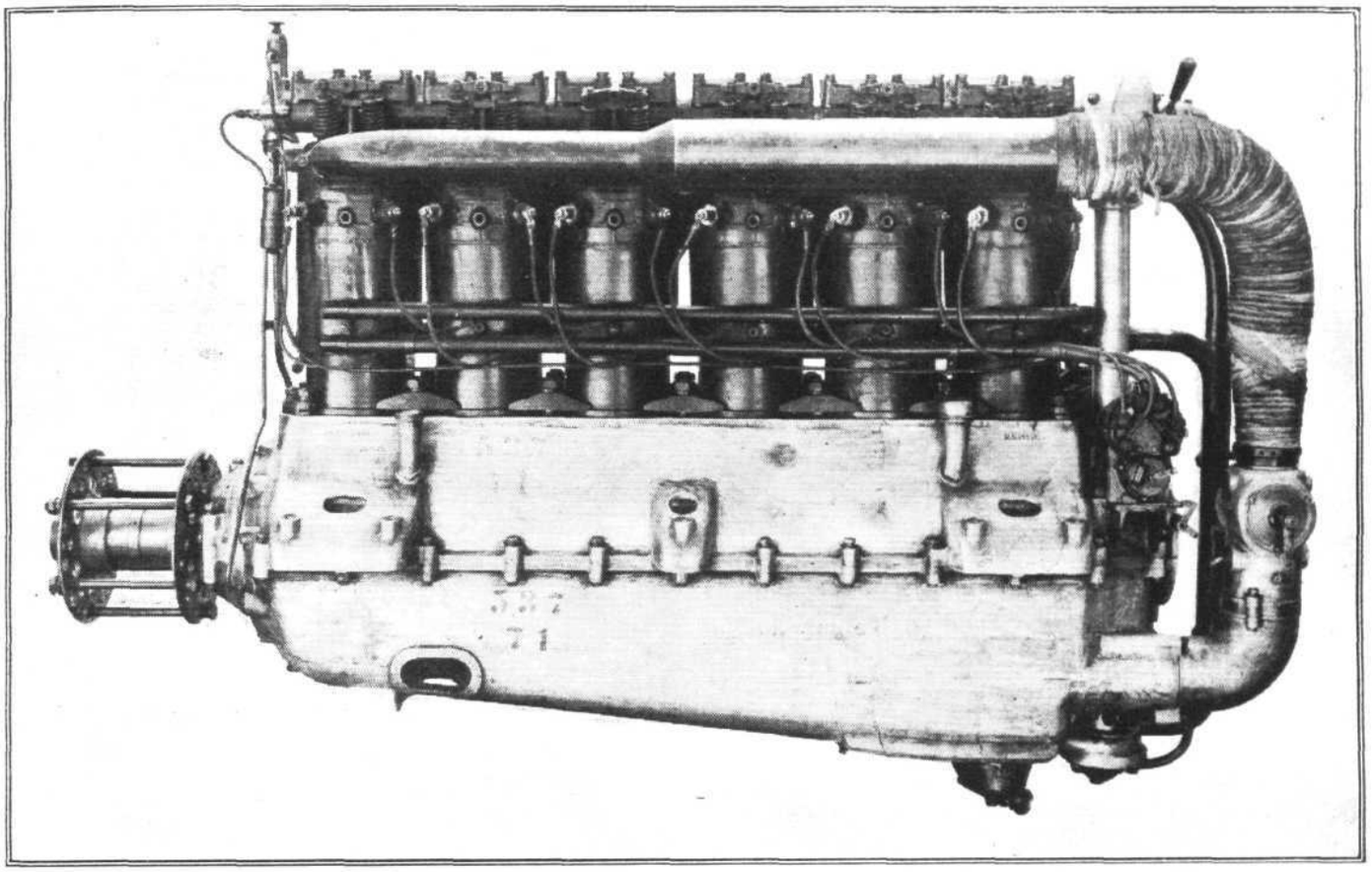


Fig. 1.—The Mercedes engine ; induction side.

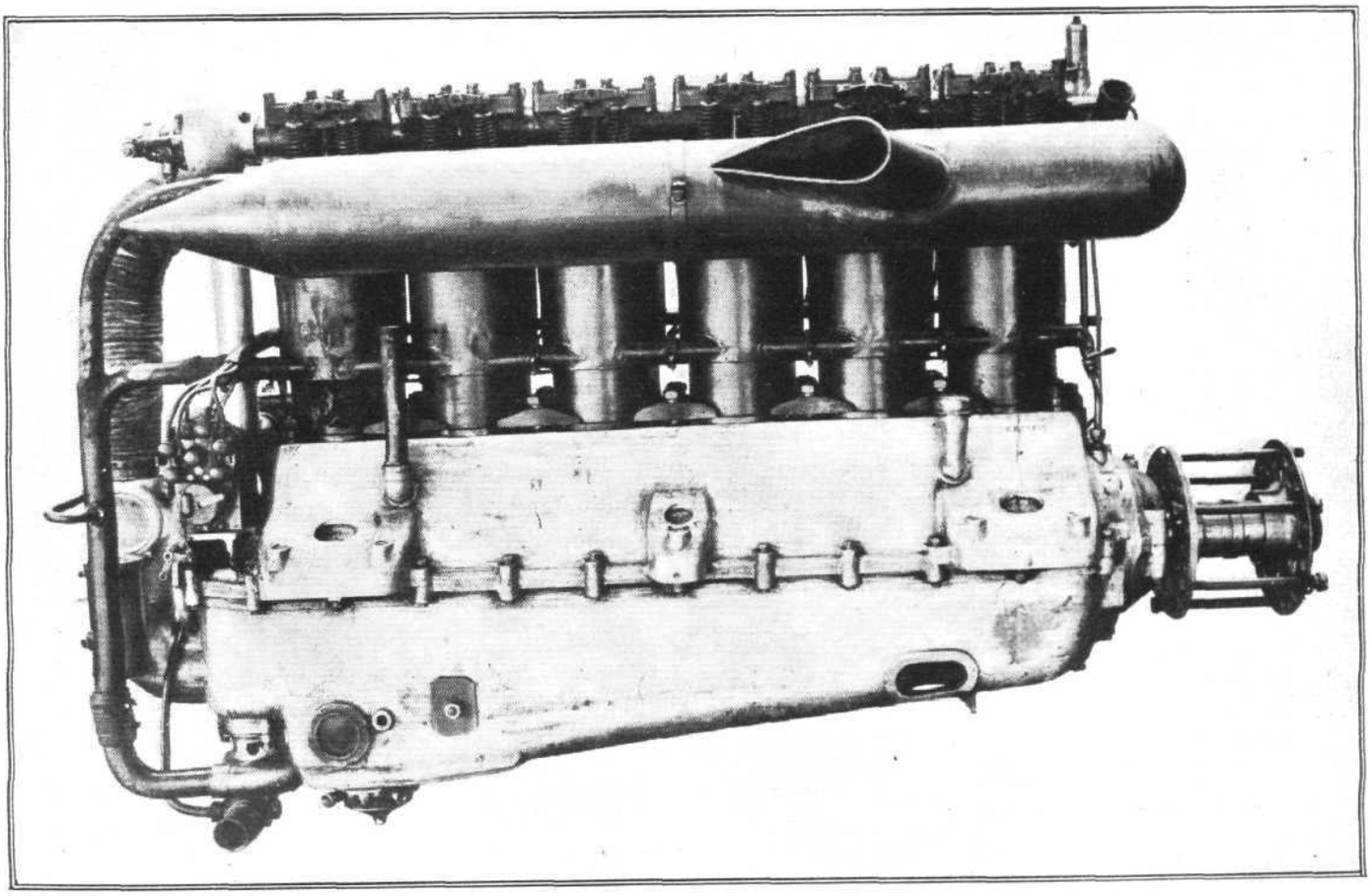


Fig. 2.—The Mercedes engine ; exhaust side.

THE details of the following report on the latest type Mercedes engines and the accompanying scale sectional drawings have been collected from an investigation of the twin engines taken from the captured German aeroplane G.23, a three-seater "Gotha" biplane of the pusher type, which was brought down near Vron by Lieut. Breadner on April 23rd, 1917. The machine was set on fire by the occupants after landing and partially destroyed, one engine being scrapped and the crankcase melted. The other engine, No. 29870, however, was little damaged, with the result that after certain repairs had been carried out, this engine was able to be put through a bench test at the Royal Aircraft Factory, where the following particulars regarding b.h.p., consumption, &c., were taken :—

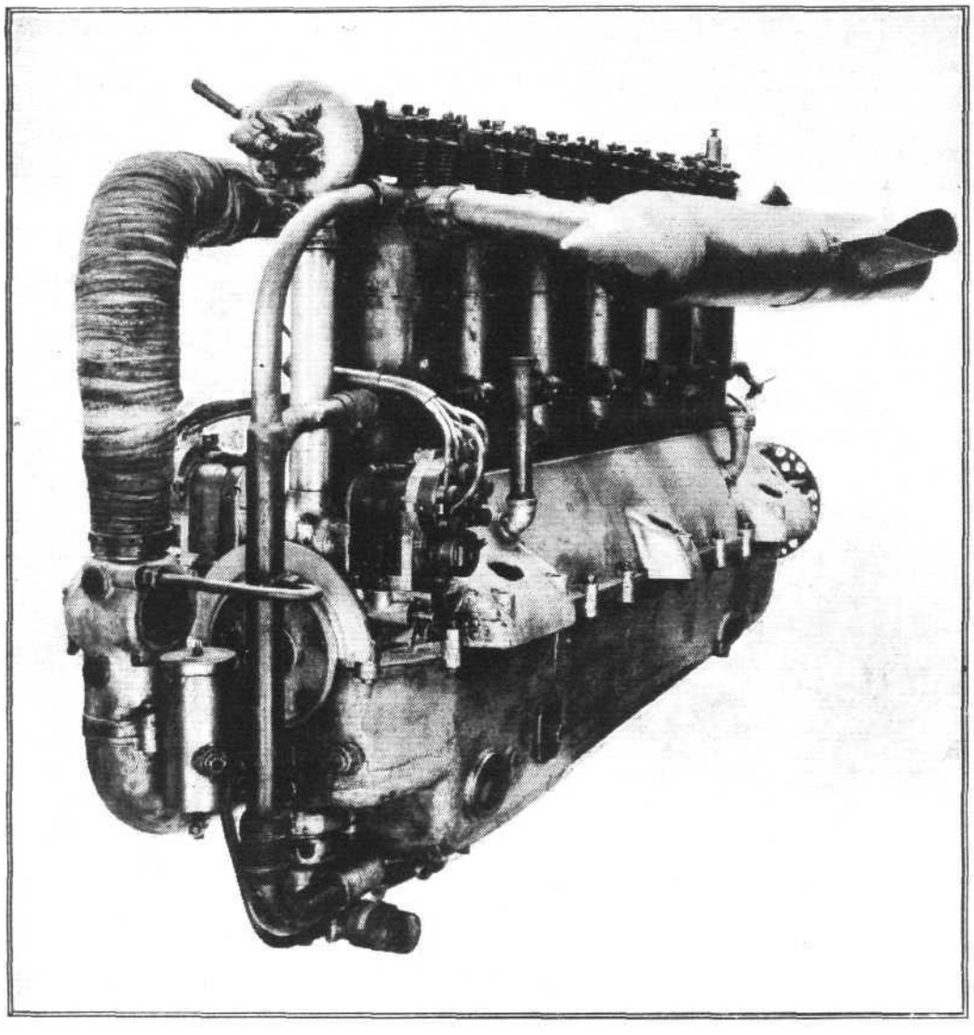


Fig. 3.—Front end of engine.

Leading Particulars of the 260 h.p. Mercedes Engine.

Number and arrangement of cylinders, 6, vertical; bore, 160 mm., 6.30 in.; stroke, 180 mm., 7.09 in.; stroke/bore ratio, 1.125—1; stroke volume of one cylinder, 3,620 cub. cms., 220.82 cub. in.; total stroke volume of engine, 21,720 cub. cms., 1,324.92 cub. in.; area of one piston, 201.062 sq. cms., 31.164 sq. in.; total piston area of engine, 1,206.372 sq. cms., 186.984 sq. in.; clearance volume of one cylinder, 920 cub. cms., 56.12 cub. in.; compression ratio, 4.94—1; normal b.h.p. and speed, 252 at 1,400; piston speed, 1,653 ft. per min. at 1,400, 1,775 ft. per min. at 1,500.

Brake mean effective pressure, 107.5 lbs. per sq. in.; cub. in. of stroke volume per b.h.p., 5.25; sq. in. of piston area per b.h.p., 0.74; h.p. per cub. ft. of stroke volume, 329.14 h.p.; h.p. per sq. ft. of piston area, 194.6; direction of rotation of crank, anti-clock; direction of rotation of propeller, anti-clock; normal speed of propeller, E.S.

Lubrication system, forced feed to all bearings and camshaft; brand of oil recommended, Sternoil (air-cooled) on test; oil pressure recommended, no indicator; oil temperature recommended, not above 60° C.; oil consumption per hour, 8.125 pints; oil consumption per b.h.p. hour, .032 pint; specific gravity of oil, .9.

Type of carburettor, 1 twin jet Mercedes; mixture control, automatic; fuel consumption per hour, 125 pints; fuel consumption per b.h.p. hour, .605 pint; specific gravity of fuel, .720.

Type of magneto, 2 Z.H.6; firing sequence of engine, prop. 1 5 3 6 2 4; numbering of cylinders, prop. 1 2 3 4 5 6; speed of magneto, 1.5 E.S.; direction of rotation of magneto, facing driving end of armature, anti-clock; magneto timing, 31° E.

Inlet valve opens, degree on crank, 1° L.; inlet valve closes, degree on crank, 49° 3′ L.; maximum lift of inlet valve, 10.125 mm.; diameter inlet valve, 55.25 mm.; area of inlet valve opening (2 valves), 35.12 sq. cm., 5.44 sq. in.; mean gas velocity through inlet valve, 151.1 ft. per second; clearance of inlet tappet, .018 in.

Exhaust valve opens, degrees on crank, 50.6° E.; exhaust valve closes, degrees on crank, 17.6° E.; maximum lift of exhaust valve, 10 mm.; diameter exhaust valve, 55.25 mm.; area of exhaust valve opening (2 valves), 34.70 sq. cm., 5.4 sq. in.; clearance of exhaust tappet, .018 in.

Speed of revolution counter drive, camshaft speed.

Weight of engine complete without water, fuel or oil, 936 lbs.; weight per b.h.p, ditto, 3.71 lbs.; weight of exhaust manifold, 26 lbs.; weight of starting gear not integral with engine, nil; weight of fuel per hour, 136.8 lbs.; weight of oil per hour, 9.14 lbs.; total weight of fuel and oil per hour, 145.94 lbs.; gross weight of engine in running order, less fuel and oil, 1,099 lbs. approx.; weight per b.h.p. ditto, 4.36 lbs.; gross weight of engine in running order with fuel and oil for six hours, 2,072 lbs.; weight per b.h.p. ditto, 8.2 lbs.

Period of induction, 228°; period of exhaust, 247°; half compression cam opens exhaust cam, 12° A.B.C.; half compression cam closes exhaust cam, 44° B.T.C.; diameter of induction pipe branch, 75 mm.; diameter of induction pipe main, 100 mm.; diameter of choke tube, 32 mm.

Length of connecting rod between centres, 326 mm.; diameter of crank pin, 64 mm.; length of crank pin bearing, 80 mm.; diameter of journals, 64 mm.; length of journal bearings, 64 mm.; length of front journal bearing, 104 mm.; connecting rod side-clearance (total) in piston, 2.25 mm.

Total capacity of each petrol tank, 95 galls.; total capacity of each oil tank, 7.25 galls.; total capacity of each water in system, 6.5 galls.

Weight of complete cylinder with valves and springs, 34.25 lbs.; weight of complete piston with rings and gudgeon pin, 10.725 lbs.; total weight of complete connecting rod with gudgeon pin bush, 7 lbs.; weight of connecting rod, big-end, complete, 4 lbs. 14 oz.; weight of connecting rod, small-end, with bush, 2 lbs. 2 oz.; weight complete valve with spring washer and nut (inlet and exhaust), .759 lbs.; weight of valve rocker complete, 1.246 lbs.; total weight of engine with water, including raidator, &c., 1,099 lbs. approx.; weight of crankshaft with propeller boss, 139.5 lbs.

Diameter of piston at top, 159.258 mm.; diameter of piston

at bottom, 159.715 mm.; width of rings, 5 mm.; width of gap in rings in cylinder, 16/1000 mm.; diameter of water pump inlet, 44 mm.; diameter of water pump outlet, 44 mm.

General Description.

In many respects these engines resemble the 160 h.p. Mercedes, and are of the usual German aero-engine design, being of the six-cylinder, vertical type, water-cooled, with a massive six-throw crankshaft running in plain bearings, the design throughout aiming at strength and reliability combined with ease of manufacture in preference to the consideration of weight per b.h.p. as the primary factor in design. The salient features of the 260 h.p. Mercedes are briefly as follows: Notwithstanding its abnormal size, the whole engine is of very proportionate and clean design throughout, as shown in the accompanying photographs and detail drawings of the engine. The complete engine, including the propeller boss, measures 6 ft. 5½ in. overall, and from the botton of the sump to the top of the overhead camshaft casing measures approximately 3 ft. 10 in. The bore of each cylinder is 160 mm. and the stroke 180 mm. Four valves, *i.e.*, two inlet and two exhaust, are fitted in the head of each cylinder and are operated by an overhead camshaft, running in a detachable casing of malleable cast iron supported on brackets screwed into the head of each cylinder. All the valves are interchangeable. A half compression gear, employing a sliding camshaft device similar to that in the 160 h.p. Mercedes, is fitted to the rear end of the shaft casing. A single carburettor employing a main jet and a slow running jet is attached to the rear end of the base chamber, taking its air supply from the interior of the base chamber through a 4-in. diameter passage cast in the bottom of the crank chamber, which is constructed with a false bottom. The bottom halves of the crankshaft main bearing housings, or bearing caps, are cast integral with the bottom half of the crankcase; the long bolts which secure the bearing caps pass through the top half of the crankcase, and are used to secure the cylinders in position by triangular clamps, a design of questionable merit, but a method which undoubtedly adds increased stiffness to the crankcase construction.

The lubrication system is forced to all bearings through the drilled crankshaft from a four-throw eccentric-driven plunger pump, which is an improved design on the 160 h.p. form of Mercedes type. The scheme embodies an "auxiliary" sump in the front end of the crankcase, and small supplementary pump plungers, which work in conjunction with the main oil pump for the purpose of feeding fresh oil into the system from the service oil tank. Full details of this lubrication system, and also of the somewhat complicated Mercedes oil pump, are given in the following description.

Two Bosch Z.H.6 magnetos are used, driven off the camshaft vertical driving shaft, one being a starter magneto. All plugs are fitted on the induction side of the cylinders.

The water-pump driving spindle is lubricated whilst in a flight by a ratchet-driven grease lubricator

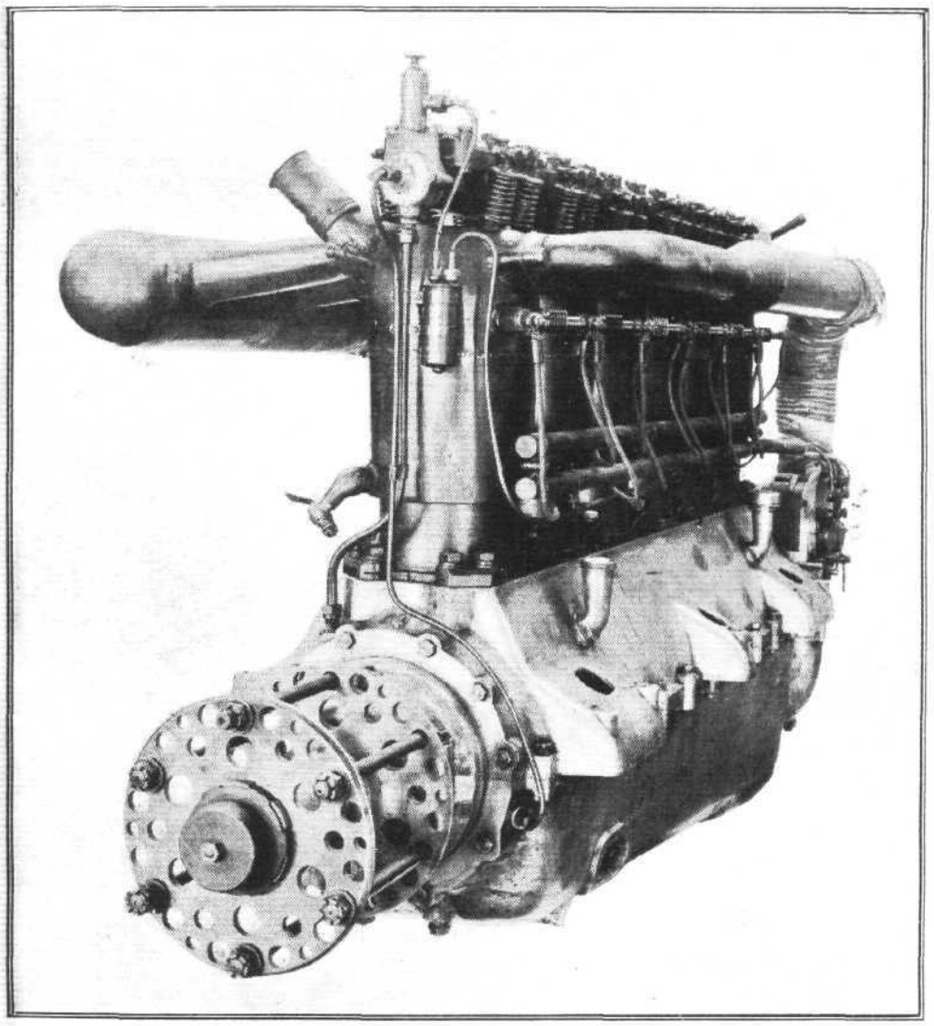


Fig. 4.—Rear end of engine.

Fig. 6.—The Mercedes cylinder.

worked by a cable and lever from the pilot's seat. An electric tachometer is driven at engine speed from the rear end of the camshaft through a flexible shaft.

Details of Construction.

Cylinders (Fig. 8).—The construction of the built-up cylinders, which are composed entirely of steel forgings and sheet steel pressed to the form of the

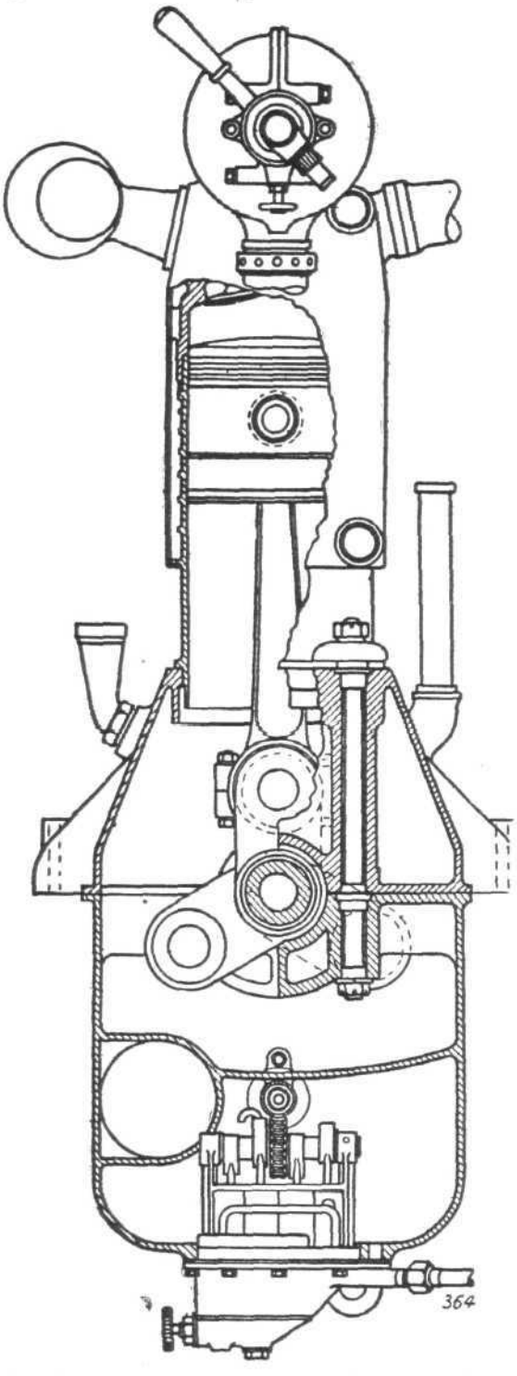


Fig. 5.—Cross-section through cylinder and crankcase.

water jackets, is an interesting example of expert acetylene steel welding. The method of building up the cylinders, and their general construction, is shown in the scale cross-sectional drawing (Fig. 8). The steel cylinder barrels are screwed into the cylinder head, the pitch of the thread being 1.75 mm. The cylinder barrels are machined from steel forgings, the thickness of the cylinder walls being 3.5 mm., this dimension being increased to 6 mm. at the holding-down base flange. Six rectangular ribs are machined on the outer diameter of the cylinder barrel, the distance between the ribs increasing towards the base of the cylinder. The cylinder barrels extend 35 mm. below the base flanges and are of 3 mm. thickness for a depth of 12 mm.; the extension is reduced to 2.75 mm. in thickness at the lowest part (Fig. 8). The cylinder heads are machined from steel forgings, into which are built the four valve pockets and inlet and exhaust ports.

The valve face seatings are machined in the

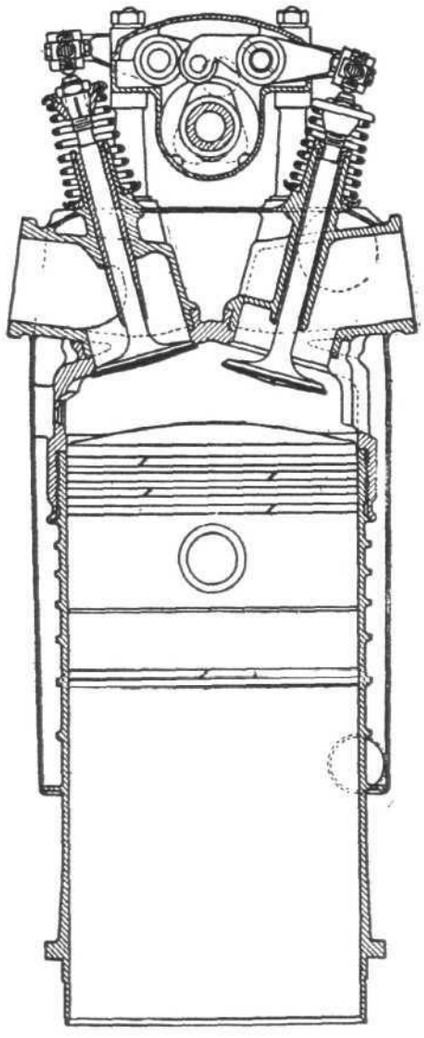


Fig. 7.—Cross-section through cylinder and valve gear.

cylinder heads, the thickness of the crown of the cylinder head being 11 mm. The valve pockets which are machined from steel forgings are acetylene welded into the cylinder heads, and steel valve stem guides are pressed into the valve pockets and welded. The valve stem guides are bushed with phosphor-bronze liners, which are pressed into the guides. It will be noticed that the exhaust valve stem guide is considerably longer than the inlet valve stem guide. The water-jackets are built up in four sections from sheet steel pressings 1.25 mm. in thickness, the lower section of the jacket being of barrel formation, and welded to the flange joint on the cylinder walls. The top sections are in halves, and encircle the valve pockets, the joints being welded vertically on the centre line of the valve ports. The top of the water-jacket is a sheet steel disc which is welded on to the flanged top sections, and the water circulation pipe connections are welded into the top and bottom of the jackets on the exhaust side.

The sparking plug bosses are fitted and welded into

the cylinder barrels on the induction side, just below the inlet valves. As in the 160 h.p. Mercedes engines, the exhaust valve stem guides are water cooled by recesses formed in each of the exhaust valve pockets so that the water is led right up to the valve stem guides. Considering the size of the cylinders, they are remarkably light in weight. The complete cylinder with valves, valve springs, &c., including the two brackets screwed into the cylinder head to carry the camshaft, weighs 34.25 lbs.

(To be continued.)

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Killed.
Flight Sub-Lieut. D. R. C. Wright, R.N.

Accidentally Killed.
Flight Sub-Lieut. V. H. Littleboy, R.N.
Flight Sub-Lieut. R. Swallow, R.N.

Died of Wounds.
L8772 Off. Stud. 2nd class G. H. Jones, R.N.A.S.

Died of Injuries.
Flight Lieut. J. Gorman, R.N.
Flight Sub-Lieut. T. M. Greeves, R.N.

Previously reported Missing, believed Drowned, now reported Drowned.
Observer Sub-Lieut. H. Odle, R.N.

Missing (feared Killed).
Flight Commander (acting Lieut. R.N.) W. F. Horner, R.N.

Missing (feared Drowned).
Flight Sub-Lieut. F. C. Cressman, R.N.

Severely Wounded.
Lieut. E. H. Taylor, R.M.A.

Slightly Injured.
Prob. Flight Officer G. W. Cooper, R.N.
Flight Sub-Lieut. J. A. Morell, R.N.

Accidentally Injured.
Lieut. E. R. O. Cave, R.N.V.R.
Flight Lieut. V. A. Watson, R.N.

Missing.
Flight Sub-Lieut. S. S. Richardson, R.N.

Reported by the War Office:—

Killed.
2nd Lieut. S. W. Ayers, Aus. F.C.
Capt. T. V. Hunter, Rif. B., attd. R.F.C.
Lieut. J. C. Kirkpatrick, R.F.C.
30860 2nd Air-Mech. F. Benden, R.F.C.
51746 2nd Air-Mech. G. C. Bradbury, R.F.C.
20834 1st Air-Mech. M. Davies, R.F.C.
106015 Pte. D. McNeill, R.F.C.
3097 Pte. J. Willey, Lancers, attd. R.F.C.

Previously Missing, now reported Killed.
2nd Lieut. N. Bell, Ches. R., attd. R.F.C.
2nd Lieut. A. J. Chapman, R.F.C.
2nd Lieut. R. Dutton, R.F.C.
Lieut. R. W. Ellis, R.F.C.
2nd Lieut. R. A. Inglis, R.F.C.
2nd Lieut. W. L. Inglis, R. Sco. F., attd. R.F.C.
2nd Lieut. F. W. Kirby, R.F.C.
Capt. G. K. Smith, M.C., R.F.C.
2nd Lieut. H. F. Young, Sher. For., attd. R.F.C.
88163 2nd Air-Mech. W. Addison, R.F.C.
65004 Sergt. W. D. A. Backhouse, R.F.C.
3223 1st Air-Mech. G. Stewart, R.F.C.
61869 2nd Air-Mech. E. Wood, R.F.C.

Previously Missing, now reported Killed or Died of Wounds.
Lieut. R. B. Carter, Alta. Regt., attd. R.F.C.
Lieut. R. H. Sawlor, N.B. R., attd. R.F.C.

Previously reported Wounded, now reported Died of Wounds.
Lieut. S. W. Rawles, A.S.C., attd. R.F.C.

Previously Missing, now reported Died as Prisoner in German hands.
78285 Pte. G. Worthing, R.F.C.

Died of Wounds.
2nd Lieut. F. M. Corry, Sher. For., attd. R.F.C.
2nd Lieut. A. Ross, R. Sco. F., attd. R.F.C.
15998 2nd Air-Mech. W. E. Guernsey, R.F.C.

Accidentally Killed.
Lieut. W. N. E. Scott, Aus. F.C.
Capt. H. H. Storrer, Aus. F.C.

Died as Prisoner in Turkish hands.
3318 2nd Air-Mech. W. C. Pass, R.F.C.

Died.
1137 R. A. Ferreira, Aus. F.C.
22353 2nd Air-Mech. P. H. T. King, R.F.C.
49398 2nd Air-Mech. W. H. Tooze, R.F.C.

Wounded.
2nd Lieut. A. H. Burns, R.F.C.
2nd Lieut. J. H. Cooper, A. and S. Hrs., attd. R.F.C.
2nd Lieut. W. T. V. Harmer, Sea. Hrs., attd. R.F.C.
2nd Lieut. F. A. Jeppe, R.F.C.
Capt. H. B. McKinnon, Cent. Ont., attd. R.F.C.
Lieut. A. J. Pratt, Aus. F.C.
2nd Lieut. T. R. Scott, R.F.C.
Capt. L. H. T. Sloan, Cam. Hrs., attd. R.F.C.
2nd Lieut. T. L. Steele, R.F.C.
2nd Lieut. B. Thomas, R.F.C.
Lieut. W. M. Turner, R.G.A. and R.F.C.

Previously reported Prisoner, now reported Wounded and Prisoner in German hands.
Lieut. J. M. Atkinson, A.S.C., attd. R.F.C.

Missing.
2nd Lieut. H. V. Caunt, W. Yorks R., attd. R.F.C.
2nd Lieut. D. G. Clark, Aus. F.C.
Lieut. A. Griggs, Aus. F.C.
2nd Lieut. H. T. A. Honeyman, R. Sco. F., attd. R.F.C.
Capt. T. S. Malcolmson, R.F.A., attd. R.F.C.
2nd Lieut. L. H. Thierry, R.F.C.

Previously Missing, now reported Prisoners in German hands.
2nd Lieut. T. L. Atkinson, R.F.C.
2nd Lieut. A. G. Cribb, R.F.C.
2nd Lieut. E. H. Cutbill, R.F.C.
2nd Lieut. J. A. M. Fleming, R.F.C.
Lieut. E. G. S. Gordon, R.F.C.
2nd Lieut. B. Harker, Lan. Fus., attd. R.F.C.
2nd Lieut. O. M. Hills, M.C., R.F.C.
2nd Lieut. W. H. Jones, R.F.C.
2nd Lieut. T. J. Kent, R.F.C.
2nd Lieut. W. R. Kingsland, R.F.C.
Lieut. J. H. Lawes, E. Yorks R.
2nd Lieut. D. McLaurin, R.F.C.
2nd Lieut. W. G. Morgan, R.F.C.
Lieut. T. W. Morse, Cent. Ont., attd. R.F.C.
2nd Lieut. W. C. Pruden, R.F.C.
2nd Lieut. E. C. S. Ringer, R. Suss. R., attd. R.F.C.
2nd Lieut. A. W Rush, R.F.C.
2nd Lieut. M. W. B. Stead, R.F.C.
Capt. E. P. Wilmot, M.C., R.F.C.

The Mannheim Raid.

IT is now known that the British pilot who was forced to land during the raid on Mannheim on December 24, was 2nd Lieut. G. F. Turner. British prisoners, who arrived in Switzerland on December 28 and who were in Mannheim at the time of the raid, report that they were told by workmen that a big ammunition factory had been entirely destroyed and the bridge over the Neckar blown up. The Kaiser with his staff had only left Mannheim an hour before the raid.

The German Way.

THE *Frankfurter Zeitung* states that several camps have been established in various districts of Stuttgart and in the neighbourhood for British and more particularly for French war prisoners of all ranks, and also some hospitals for convalescent war prisoners.

It is added, in explanation of this, "they will have to share with the population of the town of Stuttgart the dangers of air attacks."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING.

A SPECIAL MEETING of The Committee was held on Wednesday, the 19th ult., when there were present: Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Squadron-Commander John D. Dunville, R.N., and Mr. J. H. Nicholson. In attendance Lieut.-Commander H. E. Perrin, R.N.V.R.

Election of Members.—The following New Members were elected:—

Capt. Arthur Lawrence Anthony, R.A.M.C.
Percy Howard Ashworth.
Capt. George Brown, R.F.C.
Capt. Stephen Henry Carnelley.
John Henry Downey.
Harvey Richard Drew.
Lieut. Ernest Basil Falkner, R.N.V.R.
Lieut. Gilbert Evelyn Falkner (3rd D.C.L.I.).
Lieut. William Walker Gibson.
Capt. Frederick Russel Hardie (3rd Hussars).
Major Clement Hirtzel, R.F.C.
Capt. Percy St. G. Kelton (W.A.F.F.).
Frederick Osborne Simeon Leak.
Col. Henry Millett Nicholls.
John Amery Parkes.
Andre Pereire (French Air Service).
Lieut. Edward Murray Speakman, R.N.V.R.

Annual Subscription.

Members are reminded that the Subscription for the current year is now due.

THE FLYING SERVICES FUND, administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Subscriptions.	£	s.	d.
Total subscriptions received to D.c. 11th, 1917	12,510	16	6
G. H. Mansfield, Managing Director of the Aircraft Supplies Co., Ltd., 125, Long Acre, W.C. 2; Proceeds of the sale of copies of "Standard A.G.S. Parts for Aircraft," by Bernard Isaac (Twelfth contribution, making a total of £43 11s. 10d.)	1	17	6
Staff and Workers of Gwynnes, Ltd. (Fifty-third contribution)	11	11	3
Julius A. Meller	0	10	6
Employes in Aviation Department of Messrs. J. Samuel White and Co.	1	17	1
Total, January 1st, 1918	12,526	12	10

H. E. PERRIN, Secretary.
3, Clifford Street, New Bond Street, W. 1.

"X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of places visited by enemy aircraft to be published, we are, as before, giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

"X 85" Raid (December 18th).

THE following *communiqué* was issued on December 21st:—

"The Press Bureau is authorised to state that it has been established from our pilots' reports that a raiding aeroplane was struck by machine-gun fire from one of our machines over London during the raid on December 18th. Subsequent observations proved that this raider went off in a damaged condition, and was ultimately brought down in the sea off the Kentish coast two hours later."

"X 86" Raid (December 22nd).

The following *communiqués* have been issued by the Field-Marshal Commanding-in Chief Home Forces:—

"Dec. 22nd, 10.30 p.m.

"An air raid was attempted on the Kentish coast shortly after 6 p.m. One raider was forced to descend close to the coast, the crew of three being captured alive. No other machines came over the land at this time.

"A second attack developed about 9.30 p.m., when a few bombs were dropped in Thanet. The raiders did not penetrate farther inland."

"Press Bureau, Dec. 23rd, 11.20 a.m.

"No casualties or damage occurred in Saturday night's air raid."

German Version.

"Berlin, Dec. 23rd.

"The aerial activity, which continued very strong throughout the day in many sectors, was also very lively during the moonlit night.

"Bombs were dropped freely on Sheerness, Dover, and Dunkirk, as well as the munition depôts behind the English and French fronts."

AIR FIGHTING IN DECEMBER.

Two hundred and fifty aeroplanes—British, French, and German—were officially reported down during December says the *Times*, in its excellent monthly summary. Eighteen of these, Germans, were brought to earth by British pilots on the last day of November. Deducting these, and making allowance for possible duplication in any of the official reports, the number brought down actually within the month is 232.

In November, the total was 370. Of the December total the Allies claim 171 and the Germans 61.

Perhaps the most interesting feature of the month's aerial warfare on the British front is the number of German aeroplanes which have been brought down in our lines by both pilots and gunners. Twenty have thus fallen—seven to anti-aircraft guns, 12 in fights, and one which landed, probably owing to engine defect, and was captured by us intact. These figures give point to Sir Douglas Haig's not infrequent remark that the enemy's machines were, on this or that day, "more enterprising," or "more aggressive" than usual, and indicate the price they have been made to pay for their excursions in a westward direction.

One hundred and one German machines have been brought down by our men—78 on the battlefront and 23 by the R.N.A.S., operating under the orders of the Admiralty. The naval airmen have again a distinguished record. In October, they destroyed or drove down out of control, 24 machines, with a loss to themselves of four machines, and in November the corresponding figures were 18 to 0. Last month, they destroyed 12, and drove down out of control 11 (and of these it is claimed that three were probably destroyed), and lost only one machine themselves. Of the 78 German aeroplanes accounted for on the battlefront, exactly half were destroyed in fights, 28 were driven down out of control, 10 fell to the guns, and one was forced to land. Our loss, as reported by General Headquarters in France, was 36 machines, one of which failed to return from the raid on Mannheim.

French airmen and gunners accounted for 69 enemy machines—40 destroyed and 16 driven down damaged in fights, seven brought down by the gunners, and six forced to land. One machine was brought down during the month by a Belgian airman.

FLIGHT

THE PROBABLE TREND OF AEROPLANE DESIGN.

By R. F. MANN.

DURING the last few months I have been blessed, or the other thing, with considerable leisure owing to ill-health, and having spent some of the time reviewing the present stage in the development of aeroplane design with the view of determining what changes are likely to occur in the immediate future, it may be of interest to the readers of "FLIGHT" if I set down some of the conclusions arrived at.

Aerofoils, Strutting, Bracing and Section.

The system of strutting and bracing biplane wings has undergone fewer large modifications than any other part of an aeroplane, but nevertheless signs are not wanting that considerable changes are likely to occur in the near future with the object of reducing resistance. Since any considerable improvement in streamline sections is very remote, this reduction of resistance can only be obtained by reducing the number of struts and wires hitherto used. Two interesting machines in which attempts had been made to achieve this were the S.E. 4 and the Sopwith triplane. In the former machine use had been made of the I strut, the flying wires being taken from the extremities of the arms, which extended from the front to the rear spar. The chord of the wings was large, and in consequence of the travel of the C.P. the stresses in the strut were high. In the Sopwith, however, these stresses were kept within reasonable limits by employing wings of small chord and obtaining the necessary area by adding a third wing. Unfortunately, this method is only applicable to small machines, so it cannot be regarded as a complete solution of the problem. Two other forms of built-up strut have been suggested—the X and K. The latter has been employed on a few machines turned out by the Curtiss Company, but they both have disadvantages which are not shared by the I type.

(1) Owing to their great side area the range of vision of the crew is greatly impaired.

(2) This side area is unnecessary for stability and liable to make the machine uncomfortable to fly in a gusty wind. Also it is quite possible that the resistance and skin friction of such a strut would be equal to that of two plain struts and the necessary incidence wires.

All things being considered, the I strut would appear to offer the best solution, but how are the high stresses in it, caused by the travel of the C.P., to be overcome? It is possible to design such a strut with sufficient F.S., but a large percentage of the gain due to lessened resistance may be lost through added weight. Failing the advent of an exceptionally light but strong alloy, the only other course is to produce a wing section which, without a greatly impaired value for Ky and L/D, has a considerably smaller travel of the C.P. Naturally, a section with a stationary C.P. would be ideal for this purpose, but I fear that the loss in efficiency would nullify any other advantage.

What is required is a satisfactory compromise, and it should be attainable if as much research is expended on it as there has been in getting the present highly efficient sections.

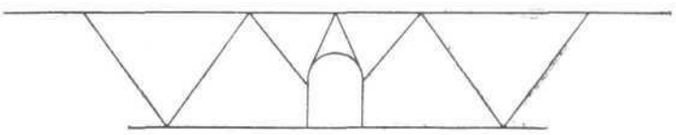
Similar large changes in the bracing of the wings are in sight; in fact, already there is at least one machine in existence—the product of an allied country—in which the usual cables or streamline wires have been dispensed with and the wireless truss system used instead. See Fig. 1. The advantage of this system is that there being no flexible tension members, vibration, and the consequent increase in resistance, is overcome.

This vibration, whilst not of much importance in small machines where the length of the bays is small, assumes rather unpleasantly large proportions in the long bays of, say, a bomber. As in the case of the I strut this construction comes out heavier, but as the saving in resistance is considerable it is more than likely that in the end there is a distinct gain—in fact, the performances of the machine mentioned show that this is indeed the case. With a satisfactory I strut on the one hand and a thoroughly tried out wireless truss system on the other, the next step is a combination of the two—*i.e.*, a wireless truss constructed with I struts. Probably there are people who would contend that this is looking too far ahead, and that as really large machines are in existence which use the, so to speak, old-fashioned system of strutting and bracing with satisfactory results there is no need to consider anything else.

The obvious retort is that there would not be the convenient and speedy car of to-day if our ancestors had been satisfied with the pony trap and stage coach.

Fuselage, or Body.

As the shape and general lay-out of the body are to a certain extent governed by the type of engine employed, it will be as well to devote a few lines to a general survey of engines. When looking back over the past three years, one is immediately struck by



three facts, which are: (1) the great and continued increase in h.p., (2) the growing favour of water cooling, and (3) that although the Allies employ engines of all types—*i.e.*, the vertical, Vee, "broad arrow Vee," rotary, &c.—the German designers continue to employ the 6-cylinder vertical to the almost entire exclusion of any other. Admittedly an 8-cylinder vertical has been in use recently, but this has now been deleted in favour of a 6-cylinder of the same power approximately, and although using the number of cylinders which are common in Vee type engines the German designers *still stuck to the vertical type*. What is the reason for this great—almost universal—employment by them of the vertical type engine?

Have considerations of engine or aeroplane design weighed most in their decision? Personally, I think the latter. A better entry of the body can be obtained by using a vertical engine than with any other type, and the almost universal employment of "propeller pots" by German designers seems to show that they have realised and make the utmost use of this fact. Although using a narrow engine, their bodies are often of quite generous proportions, but performance does not appear to suffer. Is it not possible that the shape of the nose is of as much importance to resistance as the cross sectional area of a body? Again, can such an excellent entry be conveniently obtained when using an engine of the Vee type? Isn't the answer to the first question—in the words of the

politician—in the affirmative, and the second in the negative? A further point. When "propeller pots" are a feature of body design the distance between the rear of the airscrew and the front of the first cylinder can be reduced; a lighter crankshaft and crankcase resulting. When, however, a flat radiator forms the nose of the *fuselage* it is necessary—in the interests of airscrew efficiency—to keep this dimension as large as practicable, which, of course, entails added weight.

It might be argued that if this design is so usual amongst German-designed single-engined machines, why is it not so often employed for the engine *nacelles* of their twin-engined bombers?

The probable explanation is that some of their large bombers are twin pushers, in which case the use of a flat radiator in the nose does not detract from the airscrews' efficiency. Also the conditions governing the design of a *fuselage* and an engine *nacelle* are not the same. A *fuselage* carries the crew, fuel, oil, tail unit, &c., and has, in consequence, to be of fairly generous proportions at the largest point, but as this can be conveniently situated a little to the rear of the engine easy "lines" will suffice to merge this with a reasonable size of "pot" on the nose. On the contrary, the engine *nacelles* of multi-engined bombers generally have only to cover in the engine, so their cross sectional area and length are reduced to the extreme, and the prospect of saving any resistance by making the section round or oval with a "propeller pot" in front is extremely remote.

The success the German designers have achieved with semi-monocoque bodies is of as much interest and warrants as much attention as the subject just dealt with—viz., the actual shape of the nose considered in conjunction with the type of engine employed. The true monocoque body was introduced with success on special racing machines about five years ago, but the high manufacturing costs prevented it coming into general use, although its good aerodynamical qualities were fully realised. Another advantage this system of body construction has over the more common wire braced body is that it is less vulnerable to the effects of bullets, owing to there being no vital parts—such as wires and struts—liable to damage. Also there is no risk of a strip of the fabric covering the body being ripped up by a bullet and wrapping itself round the control cables.

Some of these objections were overcome by substituting the wire bracing by sheets of plywood screwed to the struts and *longerons*, thereby combining a strong bracing with an unrippable covering. This type of body construction has been very popular with German designers for some years past, and was only modified when higher speeds demanded a body of less resistance than that offered by one of rectangular section, so whilst retaining the old system of construction, but replacing the flat sides with curved ones resulted in the formation of the low resistance, oval section, semi-monocoque body employed on Albatros scouts and two-seaters, during the past year. Whilst on the subject of bodies it will be well to consider the requirements in this direction of a new type of machine which has come into prominence lately—*i.e.*, the Flying Tank.

The duties of this machine are to co-operate with the attacking infantry by harassing with machine gun fire all enemy troops in the neighbourhood. As this entails flying at a low altitude armouring is essential to protect the vital parts, such as the engine tanks, crew, &c., from the heavy and concentrated fire of the enemy with rifles and machine guns. During 1914 a French firm produced a very interesting armoured monocoque body, in which the fore part was of sheet steel as far as the rear of the gunner's cockpit, thus protecting the vital parts already mentioned. From this point to the tail the pure monocoque type of construction was employed. Although this body fulfilled all requirements of strength, low resistance, lessened risk of fire and protection of the vital parts, it was not adopted owing to the reduction of climbing speed due to the extra weight. This objection does not apply to a Flying Tank, because excessive rate of climb is not required.

The employment of a circular section body for this type of machine where low resistance is not of primary importance may appear to be unnecessary, but as it is quite probable that a round section body would deflect bullets which could easily penetrate a flat sided one, it will be seen that its employment with this type of machine is of as much value as in the case of ordinary scouts and two-seaters.

Controlling Surfaces.

There are points in the design of controlling surfaces which it will be of interest to deal with, and one of these is the rapidly growing practice of balancing—or, more correctly, partially balancing—not only the rudder, but also the *ailerons* and elevators on small, as well as on large, machines. There can be little doubt that this practice has come to stay, in fact the wonder is that it has been so long coming, for by its adoption the stress on the pilot and controls is greatly reduced. A small point, but one of certain importance, is the placing of all control cables inside the body, where the risk of damage by flying splinters of shell is considerably reduced. Also by not being exposed to the elements there is less risk of rust and consequent deterioration. Admittedly these cables are kept greased, but is it not possible for some of this to be accidentally rubbed off and the machine make a long flight in the rain before this can be replaced? Once damp has penetrated to the core of a cable grease will not fetch it out. Except for the protection from shell splinters, the same arguments apply to running the *aileron* controls through the wings, and in both cases there is a small, but not negligible, saving of resistance.

Conclusion.

There are many more interesting points to consider, but as space is limited it will be necessary to deal with the most important very briefly. Undercarriages have undergone many extensive changes in the past, and the number of types produced during the last ten years must be legion. Although some were very ingenious, those of low resistance, simplicity and lightness have been most popular. The type which satisfies these requirements best is that composed of two Vees of wood or steel tube with the axle slung from the apex by rubber cord, and its use has been almost universal during the last year or two on all except large machines. It is difficult to see how the low resistance, simplicity and lightness of this type can be improved upon, so one is forced to the conclusion that any further improvement lies in the direction of an undercarriage capable of being drawn into the *fuselage* when the machine is flying. It is doubtful whether the scout type of machine would be improved by employing this feature, as the weight of the necessary mechanism would probably nullify any advantage, so the reduction of undercarriage

resistance in this type can therefore be best achieved by research into the possibilities of obtaining modern efficiencies from a propeller of smaller diameter. Already progress has been made in this direction, for propellers of quite moderate diameter are now efficiently absorbing powers undreamt of in the dark ages of aviation.

This can truthfully be said to apply to every part of the modern aeroplane owing to the unprecedented rapid progress of aviation.

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[As a number of letters reach us signed with initials only, some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—ED.]

Notice to Correspondents in General.

Applications for commissions in the Royal Naval Air Service should be addressed to the Director of Air Services, Admiralty, S.W. The necessary form and conditions of entry can be obtained from the Secretary of the Admiralty.

Applications for commissions in the Royal Flying Corps should be sent to the Director-General of Military Aeronautics, Hotel Cecil, Strand, W.C.

Those who wish to enlist in the R.N.A.S. should apply to the nearest naval recruiting station or to the R.N.A.S. Drafting Office, Crystal Palace, S.E. Skilled mechanics are taken whatever their army classification, but unskilled men are only taken if they are classified B1, B2, or C1.

Recruiting for the R.F.C. is closed for the time being, and any enquiries should be made to the Officer Commanding, Royal Flying Corps Depôt, Farnborough.

Enquiries with regard to appointments in the A.I.D. should be addressed to the Chief Inspector, Aeronautical Inspection Department, Hotel Cecil, W.C. 2.

Lieut. J. F. A. B. (B.E.F.).—Owing to the fact that publication of illustrations of the various modern aeroplanes is not permitted we doubt whether you will be able to obtain a book giving particulars of the latest types of British and Allied aeroplanes. For purposes of identification, if this is what you chiefly require, books have, we believe, been published by the authorities. As regards enemy aeroplanes, illustrations of these have been published in "FLIGHT" from time to time in a variety of different attitudes to facilitate identification. By way of a more or less detailed description of the various types none is, we fear, obtainable for the reason indicated above.

"Setsquare" (Acton).—For anyone taking up the study of aeronautics we can thoroughly recommend "The Aeroplane Speaks," by H. Barber. It explains in delightfully non-technical language the principles underlying the flight of an aeroplane. Later on we should advise you to obtain such books as "The Aeroplane," by A. Fage; "Aeroplane Design," by F. H. Barnwell; and "The Design of Aeroplanes," by A. W. Judge. All these books may be obtained from the offices of "FLIGHT."

C. J. (Sutton Coldfields).—Generally speaking the Sopwith "Pup" and "Camel" are very much alike, at any rate, as regards their general appearance. The main difference, for identification purposes, is that one has a dihedral to the bottom plane only while the other has both top and bottom planes set at a dihedral angle.

B. B. (Birmingham).—"Aero Engines," by G. A. Burls, gives particulars and descriptions of a number of different engines, but the subject is treated more from the point of view of design than from practical considerations connected with the running of engines, the location of troubles, &c. For these we should refer you to the books issued by the manufacturers of the various engines, who usually issue booklets on the care and maintenance of their engines. So far as we know there is no book issued which deals with all the modern aero engines.

R. G. M. (London).—In designing an aeroplane for war purposes one of the most important problems, next to that of performance, is to provide as free a field of firing as possible. It is not even sufficient to provide, as you suggest, "a complete circular sweep with the gun," since the gunner has to fire not only in a horizontal but also in a vertical arc. The ideal would, of course, be a free "sphere of fire," but this is not attainable, and the object of designers of fighting machines is to provide as good a range as possible in conjunction with other considerations. Your second idea is, we believe, already being used in certain existing parachutes.

C. P. J. (Berkhamsted).—Your assumption as to the difference between the two types of F.E.'s is correct. So far as we are aware there has not been an F.E.2c., at any rate, not built in quantities. The machine you refer to as appearing in an advertisement is, we believe, an imaginary one. Yes, this machine is an R.E.7, the R.E.8 is, as you mention, very much like a B.E.2E. With regard to your last query, we cannot identify the machine from your sketch, but judging from your description of the undercarriage we should say it was an Armstrong-Whitworth.

A. T. S. (Purley).—It is not possible to say about any one aero engine that it is the best. Each has its merits and little drawbacks. Taking them all around they are all pretty good nowadays. "*Per ardua ad astra*" means "through efforts to the stars." When one engine of a twin-engined machine stops it is possible to continue the flight with the remaining engine by putting the rudder over to counteract the tendency to turn, owing to the fact that the remaining screw is pulling at a distance from the centre line of the machine. Naturally the speed is lower with only one engine running.

G. L. F. (Hythe).—The Sopwith "Pup" came before the "Camel." The engine fitted on a de H.5 is a le Rhone or Clerget.

F. A. H. (South Norwood).—"Rumpf D. D." is German for *fuselage* biplane, and is sometimes used in official German lists of captured machines, when the type is unknown to them. So far we as can make out from your rough sketches the machines are as follows: (1) Armstrong-Whitworth, (2) Sopwith (we are not permitted to say what type), (3) S.E.5, and (4) De H.4.

H. B. (West Ham).—The noise of an aeroplane flying through the air is composed of: Primarily, the exhaust of the engine, the noise of the machine passing through the air, and the noise of the revolving propeller.

E. B. (South Norwood).—Your sketch is not very accurate, but we shou'd say the machine it represents is a B.E.2e.

T. A. F. (Wolverhampton).—To the best of our recollection no announcement has ever been made of the L48 having been brought down. Probably what you have in mind is the L49, which came down intact at Bourbonne-les-Bains in France on the morning of October 20th, 1917. On the other hand you may possibly have in mind the airship "Z48," which was brought down in flames by a pilot of the R.F.C. This happened on the night of June 16th–17th, 1917.

E. N. (Taunton).—Binding cases for "FLIGHT" are supplied at a price of 2s. 10d. post free. In the picture "Getting her Height," by Roderic Hill, the wires of the Bristol scout you refer to are external drift wires, and run, as you will see by careful examination, not under the bottom plane, but from the top and bottom of the rear inter-plane struts to the engine bearer. These wires are employed, in this case, on account of the fact that the main lift wires are in the same plane as the struts, *i.e.*, slope backwards. This tends to increase the load on the internal drift wires, which load is relieved by fitting external drift wires.

AIRISMS FROM THE FOUR WINDS

THE Hull Chamber of Commerce proposes, with the co-operation of the Hull Corporation, to raise £2,000 for an aeroplane to be named "Hull" and to be presented for immediate use at the Front. The Chamber significantly adds that if it is still in existence at the end of the war the aeroplane will be presented as a souvenir to one of the colonies.

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MANNHEIM feelings are being reflected very strongly throughout German districts, within measurable distance of the air-raiding zone, and those hitherto comfortably complaisant Hun citizens who have applauded the air-pirates' attacks upon London and other open cities, are already beginning to revise their opinions upon these methods, in spite of the encouraging promise of the Hun military authorities that all attacks upon Hun nests will be returned "two blows for one." The special Amsterdam correspondent of the *Times* on New Year's Eve confirms this effect of our decision to administer a good course of the Huns' own medicine upon themselves in the following paragraph :—

"The air raid reprisals undertaken by the Allies are, I have good reason to know, having a most salutary effect in awakening the population to a sense of the consequences produced by the Germans' ruthless air raid policy. Only by this means can the German home population be brought to realise their rulers' mistakes. Every Entente air raid is a most valuable educational influence in this direction. Great nervousness is felt throughout Germany, especially in the more exposed parts, by the intention of the Americans to invade Germany by air. This subject is universally discussed, though efforts are being made to calm the uneasiness by declarations about American bluff."

Major-General E. B. Ashmore, C.M.G., M.V.O., R.A., commanding the London Air Defences, mentioned in despatches for valuable anti-aircraft services in the United Kingdom. Gen. Ashmore is forty-five years of age and a cousin of Lord Glanusk. An Artillery officer, he became connected with the R.F.C. after the war started, and received the C.M.G. for his services last year.

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SAWATIS TAWANLADAH, the chief of the famous Iroquois Indians of Canada, has, it is announced, put himself into training for the R.F.C., and is now in process of working for his wings. "S. T.," who has already, whilst serving in the Canadian Infantry, had a taste of fighting on the Western front, is prosaically and officially known in the Army as Lieut. J. R. Stacey.

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FALSE "Take Cover" alarms by the youth of London now appear to have entirely superseded all other forms of so-called amusement, such as pavement-shoving, bonnetting and healthy winter sports of a similar character. Fortunately our London magistrates do not appear to have any particularly sympathetic leaning towards this latest form of hooliganre-creation, so that it may be hoped that a few hard labour sentences as followers of the fines, and in some cases "remanded in custody," now being inflicted, may bring about an alteration in the habits of these pests of the community, whose ages of 17 and 16 probably protect them against the most speedy remedy, viz. : the birch. Nothing like personal application for reaching, à la Homocea, the nervous system.

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THAT flight in an aeroplane over Dublin last week, was characteristic of the Countess of Drogheda. Lord Wimborne was to open the Air Services Exhibition in aid of the Red Cross and other worthy objects later in the day, and Lady Drogheda, who is so utterly thorough in all she undertakes, distributed the information by leaflets, to all whom it might concern.

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IT is almost incredible that even the tame German populace can be so utterly gullible as to accept the very thin Lord Kitchener story for which certain "well-informed neutrals" who have been in Germany recently, are responsible. The story, so it is affirmed, of Lord Kitchener's captivity is kept up there in order, it seems, to relieve the anxiety of those who are becoming seriously scared about the threatened British air raids. According to all accounts, the authorities there fear nothing so much as a panic, and reassure the people by the statement : "They know better than to attempt reprisals, as they know what would happen to Lord Kitchener!"

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SOME are hoping that the rumours that the British Museum is to be made available for the Air Board may after all prove to be hot air. It *may* be that a misapprehension has arisen and the Government only intend to reserve it for the presentation in glass cases of those "a cients" who for so long successfully opposed the creation of a real Air Force.

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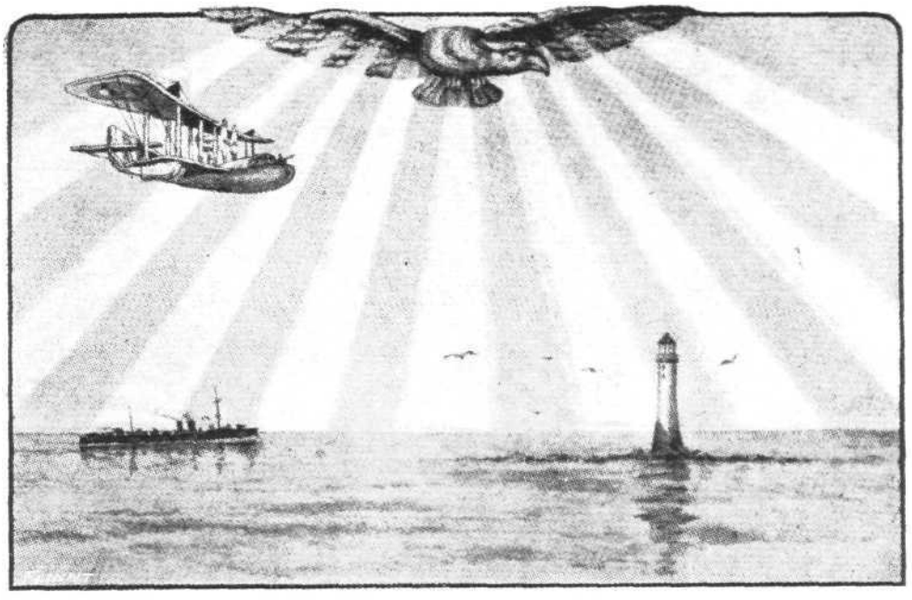
WITHOUT doubt expansion of the accommodation for the Air Force Executive is necessary, but the many arguments being put forward against the acquisition of the British Museum for the purpose, have in them sound commonsense, subject to there being alternative schemes. In this connection what is the matter with the Savoy (when the Cecil was annexed we then hinted at the bridging of the "wind-tunnel" which separates these two huge caravanserai), or the Strand Palace Hotel, or the —— ?



CHRISTMAS, 1917.—From the R.N.A.S. "Somewhere up North."

IT is to be hoped that the Kaiser appreciates the attention given to his movements by our air-raiding squadrons. Last week he was in Ghent when our pilots were paying particular attention to St. Denis Westrem aerodrome, close by, and the "All-Highest" only missed our little demonstration over Mannheim by a matter of about 30 minutes. He would have surely remained for such an opportunity to perpetrate some new blasphemy, had he only known.

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A QUAINT sort of kultured greeting on Xmas Day was accorded to some of the German trenches on the Western

From the R.N. Air Station, Hendon.

front, by three Hun aeroplanes, which flying low, when visibility was poor, swept their own trenches with gun fire in mistake for the British lines. Fritz must have "donner-wettered" with a vengeance at such brotherly attentions.

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IT was hardly likely that the "H.P.—R.R." Constantinople "stunt" would be let pass by Germany, without some rival performance. So it comes about Flight Captain Hans Hesse was put up for an attempt to outdo this fine British performance. His little "mee too" journey was from Berlin to Mosul, the junction on the Tigris to the north of Baghdad, which has recently been a somewhat prominent object of the landscape at the scene of our operations out yonder. The distance, which is 2,000 miles more or less, "a 10-day railway journey," is said to have been covered in "34 hours of flight," and is claimed by the German press as "a world record."

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A QUITE admirable suggestion, the fixing of arrows, in the direction of raid shelters, to the nearest public lamps, emanating from Scotland Yard, is being carried out in some parts of London.

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UNDER the title of the R.F.C. Auxiliary Hospital, Over-Seas Club Branch, a Convalescent Home for the use of officers in the R.F.C. has been opened at Shirley Park, near Croydon. This great boon is due to the generosity, as the name implies, of the members of the Over-Seas Club. An excellent idea of the R.F.C. Hospitals Committee, which, having regard to the cosmopolitan nature of the club membership, should materially help towards its success, is that every room or ward in the Home shall be named after some part of the British Empire or some British community in a foreign country which is contributing towards its upkeep.

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PROGRESS in the aviation industry may in a small way be followed by a study of the Post Office London Directory classified list of "trades."

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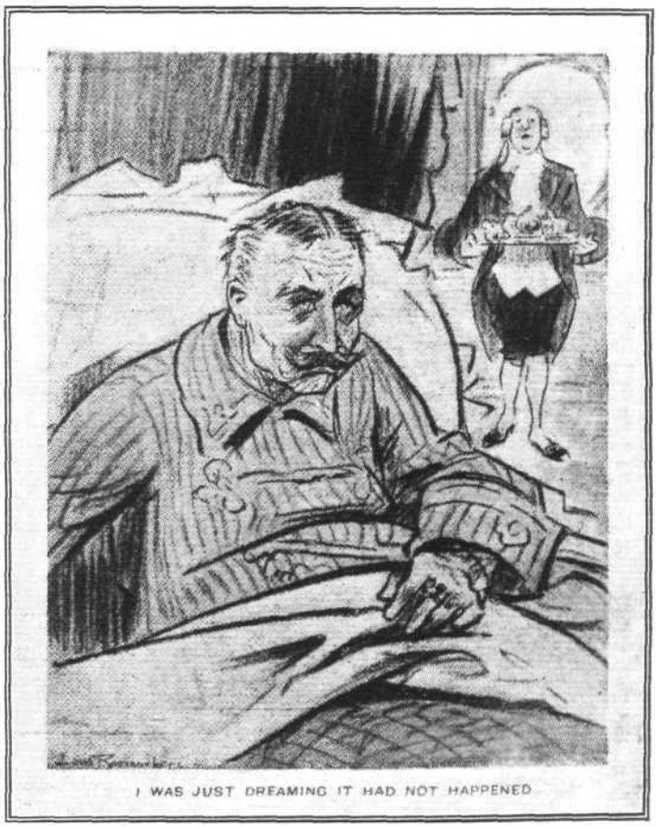
IN wishing one and all as Happy a New Year as each in his or her individual sphere may reasonably anticipate, we also thank the very numerous well wishers to "FLIGHT" who have sent along their welcome greetings in one form or another. One or two are referred to "by selection" herewith.



A cartoon by Louis Raemaekers.
From "De Telegraaf."

The British Air Services

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, *it is not repeated in this column.*

Royal Naval Air Service.

Admiralty, December 20th.

Temp. commissions (R.N.V.R.) granted to the following, seniority Dec. 17th :—Lieutenants—W. P. Woodcock, A. R. Jackson, A. E. Taylor and J. S. Street.

Admiralty, December 22nd.

The following have been entered as Prob. Flt. Officers, seniority as stated :—M. D. Macpherson, Dec. 8th ; H. D. Morley, Dec. 9th ; H. Oakley and C. B. Rutherford, both Dec. 11th. ; D. Lucy and F. C. Salmon, both Dec. 16th.

The following temporary commission has been granted :—Lieut. (R.N.V.R.) E. M. Thomas (late Prob. Flt. Off. R.N.A.S.).

Admiralty, December 26th.

Prob. Flight Lieutenant (Temporary).—H. E. Shaw, confirmed in rank of Flight Lieut., seniority Dec. 8th.

Third Writer.—G. Bell, granted temp. comm. as Lieut. (R.N.V.R.), seniority Dec. 16th.

Admiralty, December 28th.

Prob. Flight Officers (Temporary).—G. S. Cowie, G. P. Smith, W. T. Ward, and G. C. Bull, all entered as Prob. Obs. Officers (temp.), seniority respectively Aug. 12th, Sept. 2nd, 12th, and 16th (appts. as Prob. Flt. Officers terminated).

Sub-Lieutenant, R.N.V.R. (Temporary).—F. A. Fairburn, entered as Prob. Flt. Officer (temp.), seniority Dec. 16th.

The following have been entered as Prob. Flt. Officers (temp.) :—M. P. Pearson, seniority Oct. 7th ; E. C. Moon, seniority Dec. 31st ; E. G. Bridges, T. W. Williams, R. Begg, E. L. Pilling, and R. Birkenhead, seniority Jan. 7th.

Temp. commissions as Sub-Lieut. (R.N.V.R.) have been granted to A. V. Sale and D. Fredman, seniority respectively Dec. 10th and 19th.

Admiralty, December 29th.

Lieutenants.—C. J. L'Estrange-Malone, to President, addl., for duty in Plans Division, as Wing Comdr ; Dec. 20th.

Prob. Flight Officer (Temporary).—W. H. L. Halford entered as Prob. Obs. Officer (temp.), seniority Oct. 21st.

Captain (R.M.A.).—J. H. D'Albiac, D.S.O., graded as Prob. Flt. Lieut. (temp.), seniority Dec. 21st.

Royal Flying Corps (Military Wing).

London Gazette Supplement, December 20th.

The following appointments are made :—

Flight Commanders.—Temp. Lieut. F. O. Soden, Gen. List, from a Flying Officer, and to be Temp. Capt. whilst so employed ; Dec. 5th.

Flying Officers.—Lieut. J. MacKenzie, Sco. Rif., S.R., and to be secd. ; July 4th. The appointment of Temp. 2nd Lieut. J. MacKenzie, attd. Sco. Rif., notified in the *Gazette* of July 24th, is cancelled. Temp. 2nd Lieut. G. Sewell, Linc. R. ; Oct. 3rd. Temp. 2nd Lieut. K. L. Grant, Br. W. Indies R., and to be transfd. to Gen. List ; Oct. 6th. Temp. 2nd Lieut. J. D. F. West, Gen. List ; Oct. 8th ; 2nd Lieut. C. J. Page, Essex R. (T.F.), and to be secd. ; Oct. 11th. 2nd Lieut. A. C. Sharman, E. Surr. R. (T.F.), and to be secd. ; Oct. 15th. 2nd Lieut. F. D. Travers, Yeo. (T.F.), and to be secd. ; Oct. 16th. 2nd Lieut. W. Kirkpatrick, Yeo. (T.F.), and to be secd. ; Oct. 19th. 2nd Lieut. G. Fielden, Hrs., and to be secd. ; Oct. 21st. Lieut. S. A. Villiers, R.A., and to be secd. ; Dec. 3rd.

Balloon Company Commanders graded as Flight Commanders.—And to be Temp. Captains whilst so employed : Lieut. A. Knight, N. Lan. R., from a Balloon Officer ; Nov. 2nd. 2nd Lieut. (Temp. Lieut.) D. C. Bell, Midd'x R. (T.F.), from a Balloon Commander ; Dec. 1st.

Depôt Commanders.—From Park Commanders and to be Temp. Lieut.-Cols. whilst so employed ; Dec. 15th : Capt. (Temp. Major) L. F. R. Fell, D.S.O., S.R. ; Qr.-Mr. and Hon. Lieut. (Temp. Major) J. Starling.

Park Commanders.—From Equipment Officers, 1st Class, and to be Temp. Majors whilst so employed ; Dec. 15th : Temp. Capt. E. B. Palmer, A.S.C., Temp. Capt. E. M. Bettington, Gen. List.

Equipment Officers, 1st Class.—From the 2nd Cl., and to be Temp. Capts. whilst so employed. : Lieut. B. J. Nicholson, S.R. ; Aug. 28th. Qr.-Mr. and Hon. Major (Temp. Lieut.) A. Landen, D.S.O., North'd Fus. ; Nov. 16th. Temp. Capt. E. R. Moxey, Gen. List, Lieut. M. D. McFarlane, Midd'x R., and to be Temp. Capt. whilst so employed ; Nov. 21st. 2nd Cl.—From the 3rd Cl., and to be Temp. Lieuts. whilst so employed : 2nd Lieut. W. G. Murray, S.R. ; July 1st. Temp. 2nd Lieut. L. L. W. Smythe, Gen. List ; July 16th. 2nd Lieut. R. M. Bairn, S.R. ; Aug. 24th. Lieut. G. A. Curtis, S.R. ; Sept. 1st. And to be Temp. Lieuts. whilst so employed : 2nd Lieut. E. N. L. White, S.R. ; Sept. 1st. Temp. 2nd Lieut. F. Briggs, Gen. List ; Sept. 25th. Temp. 2nd Lieut. F. Grattan, Gen. List ; Oct. 1st. Lieut. J. G. Francis, S. Afr. Def. Corps ; Oct. 2nd. And to be Temp. Lieuts. whilst so employed : Temp. 2nd Lieut. J. A. Atkinson, Gen. List ; Temp. 2nd Lieut. C. J. Miln, Gen. List ; Oct. 12th. Temp. Sec. Lieut. E. Plimley, Gen. List ; Nov. 1st. 2nd Lieut. A. H. Peake-Jones, S.R. ; Nov. 22nd. The appointments of the under-mentioned notified in the *Gazette* of Nov. 21st, are cancelled : Lieut. A. H. Chapman, S.R. ; Temp. 2nd Lieut. A. D. Goodwin, Gen. List ; 2nd Lieut. D. R. Pye, S.R. 3rd Cl.—2nd Lieut. A. E. Houghton ; Oct. 31st. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank : T. W. Esland ; Oct. 12th. J. Mytton ; Oct. 27th. W. H. Shorter ; Nov. 14th. W. Warwick ; Nov. 21st. G. L. Shaw ; Dec. 1st.

Experimental Officers, 1st Class.—Graded as an Equipment Officer, 1st Cl.—Qrmr. and Hon. Lieut. (Temp. Capt.) W. Thomas, from an Equipment Officer, 1st Cl., and to retain his temp. rank while so employed ; Nov. 5th. 2nd Cl.—Graded as Equipment Officers, 2nd Cl.—From Equipment Officers, 3rd Cl. ; Oct. 13th : Lieut. A. H. Chapman, S.R. ; and to be Temp. Lieuts. while so employed : Temp. 2nd Lieut. A. D. Goodwin, Gen. List ; 2nd Lieut. D. R. Pye, S.R.

General List.—Temp. 2nd Lieut. E. J. Girdler, Gen. List, whose appointment was notified in the *Gazette* of July 27th, to take seniority (without pay) from Nov. 2nd, 1915. To be Temp. 2nd Lieuts. :—Trooper (acting. Sgt.) J. G. Tennant, from N. Zealand Mil. Forces ; Sept. 20th. Pte. J. W. H. Scales, from A.S.C. ; Sept. 27th. 1st Cl. Air Mech. C. J. M. Evans, from R.F.C. ; 2nd Cl. Air Mech. R. J. Divers, from R.F.C. ; Sept. 28th. Pte. W. M. Thomas, from A.S.C. ; Sept. 29th. Trooper H. I. J. Gibbs, from N. Zealand Mil. Forces ; Spr. S. Withington, from R.E. ; Cpl. W. S. Spark, from Yeo. (T.F.) ; Sept. 30th. Cpl. A. G. Oliver, from R.F.C. ; Sgt. G. A. Morgan, from R. W. Surr. R. (T.F.) ; Pte. H. W. Baggs, from A.S.C. ; Oct. 1st. Cpl. W. E. Le Feuvre, from R.F.C. ; Sgt. S. F. Baker, from R.F.C. ; Cpl. Pat. Murgatroyd, from R.E. ; Oct. 2nd. 1st Cl. Air Mech. P. J. T. Baddiley, from R.F.C. ; Cpl. J. Reid, from A.S.C. ; Bdr. H. R. Junor, from R.H.A. (T.F.) ; Oct. 3rd. Actg. Sgt. E. J. Crichton, from R. Highrs. (T.F.) ; Sgt. C. W. Janes, from Yeo. (T.F.) ; Oct. 6th. Pte. T. E. Huntley, from A.S.C. ; 2nd Cl. Air Mech. W. H. Oliver, from R.F.C. ; Oct. 8th. Sgt. D. Rooksby, from North'n R. ; L.-Cpl. H. Bligh, from Yeo. (T.F.) ; Pte. J. E. N. Godrich, from A.S.C. ; Cpl. A. H. Love, from Ches. R. (T.F.) ; Oct. 9th. Dvr. E. A. Locke-Waters, from H.A.C. (T.F.) ; Oct. 10th. 2nd Cl. Air Mech. C. E. Briant, from R.F.C. : Oct. 16th. Pte. J. R. Booth, from Yeo. (T.F.) ; Oct. 17th. Tech. Sgt.-Maj. A. Forsyth, from R.F.C. : Oct. 18th.

Cadets to be Temp. Second Lieutenants (on prob.) :—C. F. Abbott, A. Adam, L. C. Andrews, J. A. Archibald, E. H. Bacon, A. M. Bain, R. A. Baring, E. Belbin, W. D. Boehrer, A. A. Boothe, P. Boulton, T. Bracewell, T. G. Braine, D. Bright, C. C. Brouncker, G. R. S. Browne, C. Brown, F. Brown, J. R. Brown, R. G. Burns, C. A. Box, J. Caldwell, W. Campbell, L. N. Caple, J. K. Carruth, C. O. Carson, W. E. Catton, C. D. Clark, J. W. Clark, E. Cotton, C. S. Cope, E. C. Crossley, L. G. Davies, W. M. Denham, C. N. C. Dickson, J. M. Dunlop, G. A. Featherstone, J. C. Gordon, O. P. Gosling, S. G. Groom, W. J. Hale, G. R. Harrison, E. Hazell, H. T. Hempsall, J. A. G. Henry, J. S. Hewson, J. W. Hill, G. C. Hinge, J. P. Hitchings, L. C. Holliday, J. A. Howe, R. B. Hyslop, A. D. Kennedy, R. M. King, A. W. Kite, T. H. Laing, J. K. Lancaster, C. A. Law, C. H. Lee, L. Leeming, V. Lock, R. Logan, R. L. Low, P. M. Macnair, S. J. Manser, W. T. Martin, H. W. E. McDonald, J. F. McNamara, G. Molyneaux, H. A. Morton, J. Moston, F. W. Mulley, G. W. Nelson, M. A. Newnham, J. K. Owen, L. H. Parsons, D. G. Paterson, N. H. Penny, V. G. H. Phillips, G. Pickup, L. W. Pooley, M. J. Poulton, A. J. A. Quinn, W. Rawson, V. G. Recore, P. Reed, W. A. Richardson, J. E. G. Rochemont, S. P. F. D. R. Rust, H. J. Saker, A. D. N. Scott, W. S. Scott, F. Shepherd, J. A. Spark, W. L. Stebbens, W. J. Tuchope, R. Turner, R. G. Bradbury, W. S. Brooks, F. C. Butler, E. J. B. Carpenter, J. P. Coleman, V. N. Dickinson, A. P. Davies, R. A. Eldridge, R. S. Griffiths, O. A. P. Heron, A. C. James, A. R. Knowles, M. Landless, P. Lilico, W. G. MacCormack, D. A. McGregor, J. Pryce-Jones, J. W. Pope, T. C. Stuart, R. H. B. Stevens, N. C. Scott, J. P. Smith, S. A. Slater, R. H. Sheldrick, R. Sharrock, J. E. Swinburne, A. E. R. Trotman, H. F. E. Trigg, H. T. Taylor, P. E. J. Thomas, E. T. Treglown, H. Vost, H. D. White, W. S. Weeks, B. H. Wilson, J. D. Wollaston, J. R. Woods, L. S. Webb, P. H. B. Wood, T. F. T. M. Williams, F. S. Williams, S. H. West, R. W. S. Winter, T. Warburton, L. Wagstaff, W. C. Albery ; Dec. 13th.

Memoranda.—The following from R.F.C., to be 2nd Lieuts. whilst serving with R.F.C. :—Temp. Sgt.-Maj. C. T. Davis ; Oct. 8th. Sgt.-Maj. F. Whilton ; Oct. 18th.

General List (R.F.C.).—Cadet to be Temp. 2nd Lieut. ; Nov. 28th.—T. Martin.

London Gazette Supplement, December 21st.

General Staff.

Brigadier-General.—Bt. Lieut.-Col. C. F. Aspinall, C.M.G., D.S.O., R. Muns. Fus., and to be Temp. Brig.-Gen. whilst so employed, vice. Bt. Lieut.-Col. (Temp. Brig.-Gen.) E. L. Ellington, C.M.G., R.A. ; Nov. 18th.

Flying Officers.—Lieut. A. G. de Young, M.C., Canadian Exped. Force ; Nov. 26th. Lieut. F. H. Ronksley, R.E. (T.F.), and to be secd. ; Lieut. N. S. Harper, Canadian Exped. Force ; Temp. 2nd Lieut. C. D. Kirkbride, Res. Regts. of Cav., and to be transfd. to R.F.C., Gen. List ; Nov. 30th. The date of seniority of Temp. 2nd Lieut. (Temp. Lieut.) F. M. C. Houghton, Gen. List, is May 3rd, 1916, and not as in *Gazette* of Nov. 15th.

Brigadier Instructors in Gunnery (graded as Squadron Commanders).—From Group Instructors in Gunnery (graded as Flight Commanders), and to be Temp. Majors whilst so employed :—Temp. Capt. C. O. F. Modin, D.S.O., Gen. List ; Nov. 3rd. Lieut. (Temp. Capt.) A. P. Hartley, Ches. R. (T.F.) ; Nov. 4th. 2nd Lieut. (Temp. Capt.) A. P. Davidson, High. L.I. ; Nov. 5th.

Instructors in Gunnery (graded as Equipment Officers, 1st Class).—And to be Temp. Capts. whilst so employed :—Temp. Lieut. G. K. G. Kerr, Gen. List, from a Flying Officer (Obs.) ; Lieut. G. H. J. Mercer, D. of Corn. L.I. from an Asst. Instr. in Gunnery (graded as an Equipment Officer, 2nd Cl.) ; Dec. 1st.

Balloon Commander (graded as a Balloon Officer).—Temp. 2nd Lieut. M. L. J. Daly, Gen. List, from a Balloon Officer, and to be Temp. Lieut. whilst so employed ; Dec. 5th.

Adjutant.—Capt. R. J. H. Purcell, K.R.R.C., and to be secd. ; Nov. 26th, 1916 (substituted for notification in *Gazette* of Jan. 3rd.)

General List.—Temp. 2nd Lieut. G. F. Haseler to be Temp. Lieut. ; July 1st. Temp. 2nd Lieut. J. Wood relinquishes his commission on account of ill-health, and is granted hon. rank of 2nd Lieut. ; Dec. 22nd. Temp. 2nd Lieut. J. Tuttle resigns his commission ; Dec. 22nd. To be Temp. 2nd Lieuts. (on prob.) :—H. E. Hirst ; Oct. 25th. Comdt. N. F. S. Hubbard ; Dec. 2nd. C. MacK. Ruthven, J. G. Wright, A. C. Hayes, G. M. Mavrogordato, A. W. Coaten, J. Anderson, E. Noble, A. V. Baker, A. N. Marples, H. T. See, L. H. Vernon, E. J. S. Aston, E. Barter, H. Berridge, C. W. Clare, W. R. Fairbairn, G. T. Godfrey, B. G. Imlach, F. W. L. Johnson, W. B. Jones, D. I. D. Murray, S. H. Morgan, S. W. Margetts, W. H. Parker, A. Snell, A. J. Somers, W. R. Tuddenham, J. Tyler, A. S. Wellby ; Dec. 3rd. Actg. Sgt.-Major A. B. Taylor, from Sch. of Musk. ; Dec. 11th. G. W. Stephenson ; Dec. 12th. Cadets to be Temp. 2nd Lieuts. (on prob.) :—G. H. Bodington, J. B. Coutts, P. S. Hartley, W. F. McManus H. Smith, R. A. Wade, R. Wallace ; Dec. 16th.

Memorandum.—Temp. Sgt.-Major A. Ward, from R.F.C., to be 2nd Lieut. while serving with R.F.C. ; Nov. 13th.

London Gazette, December 22nd.

The following appointments are made :—

Flying Officers.—Lieut. F. R. McCall, Canadian Exped. Force ; Nov. 22nd. 2nd Lieut. E. J. Furlong, R. Inns. Fus., S.R., and to be secd. ; Nov. 23rd. 2nd Lieut. K. J. Gould, S.R. ; Nov. 24th. Temp. Lieut. A. P. Kelly, Gen. List, from a Flying Officer (Obs.), seniority from July 27th, 1916 ; Temp. Lieut. A. E. Smith, Dorset R., from a Flying Officer (Obs.), seniority from Feb. 9th ; Temp. Lieut. T. H. E. L. Smale, A.S.C., and to be transfd. to R.F.C. Gen. List ; Nov. 26th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—H. C. M. Nangle, J. Winter ; Lieut. G. L. Barritt, Linc. R. (T.F.), from a Flying Officer (Obs.), seniority from Dec. 2nd, 1916 ; Temp. 2nd Lieut. C. R. Strudwick, Gen. List, from a Flying Officer (Obs.), seniority from Feb. 15th ; Nov. 27th. Lieut. J. Lorimer, Saskatchewan R., Canadian Exped. Force ; Lieut. E. T. Lough, Manitoba R., Canadian Exped. Force ; 2nd Lieut. (on prob.) J. A. McOnie, S.R., and to be confirmed in his rank ; Capt. A. P. MacLean, Canadian Exped. Force, from a Flying Officer (Obs.), seniority from July 17th, 1916 ; Temp. 2nd Lieut. (on prob.) V. X. Hilton, Gen. List, and to be confirmed in his rank ; Nov. 28th. 2nd Lieut. R. B. Luard, R.A., and to be secd. ; Capt. H. S. Quigley, M.C., Canadian Engrs., from a Flying Officer (Obs.), seniority from Jan. 18th ; Lieut. G. B. Dixon, Canadian Exped. Force ; Lieut. H. A. Hay, M.C., W. York. R., S.R., and to be secd. ; Nov. 29th. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—J. J. Lister, C. D. Chapman, E. K. Davidson, W. R. Eastman, N. C. Roystan, Lieut. I. O. Chantler, Canadian Exped. Force ; 2nd Lieut. G. C. Read R.E. ; Nov. 30th.

Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—V. J. Reading ; Dec. 1st. D. Barnett, J. I. Crofton, F. Lord ; Dec. 3rd.

Adjutant.—Lieut. C. C. Webb, Leic. R. (T.F.), from an Equipment Officer, 3rd Class, and to be Temp. Capt. (with pay and allowances as Lieut.) whilst so employed ; Oct. 18th.

Equipment Officers, 3rd Class.—Temp. 2nd Lieut. E. N. Hewitt, Gen. List, from a Balloon Officer ; Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—F. O. Drownson ; Nov. 24th. W. C. Bersey ; Nov. 29th. W. D. Corse ; Dec. 7th. W. G. Horton ; Dec. 8th.

Schools of Military Aeronautics.

Assistant Instructors.—(Graded as Equipment Officers, 2nd Class).—Temp. Lieut. F. B. Luget, Gen. List, an Equipment Officer, 2nd Class ; Nov. 13th. Lieut. G. R. Spencer, Lan. Fus., S.R., reverts to Flying Officer (Obs.) ; Sept. 21st.

General List.—Temp. 2nd Lieut. J. A. A. Ferguson to be Temp. Lieut. ; Nov. 28th. The name of 2nd Lieut. Edward Meynell is as now described, and not as in the *Gazette* of Sept. 19th. To be Temp. 2nd Lieuts. (on prob.) :—A. C. Tinkler ; Nov. 20th. F. H. Shaw, W. E. Arscott, W. B. Francis, H. C. Short, F. S. McRae, S. G. Shead, H. S. Given, W. G. Blackmore, W. J. V. Duncan, E. W. Wrigley, H. L. Gaunt, F. M. Hewett, A. J. Howard, H. H. Arnold, W. F. Chauncey, F. P. Reavey, A. D. Tyler, L. N. Jarvis ; Dec. 3rd. Flight Sergt. W. R. Day, from R.F.C. ; Dec. 10th. Cadets to be Temp. 2nd Lieuts. (on prob.) : O. H. Basher, J. W. Benton, D. G. Benson, H. O. Cuffe, R. A. Crandall, T. Elliott, R. J. Gilbert, W. R. Gray, W. T. J. Hall, A. E. Heyes, J. H. Jacques, L. H. Jones, G. R. La Cecilia, R. L. T. Latour, F. S. E. McRae, W. Marginson, N. Metcalfe, J. R. Moorhouse, G. J. Mortimer, E. J. Munson, J. D. Parker, F. E. Peters, J. B. Russell, J. C. Sanders, G. F. Sharp, R. E. Sothcott, F. A. McK. Slocombe, E. B. Sprowson, E. R. Stewart, A. T. Streeter, H. R. Sturgiess, T. Tickle, A. G. Thistle, G. C. Upson, K. K. White, T. J. Wilson ; Dec. 5th.

Supplementary to Regular Corps.—2nd Lieut. (on prob.) K. J. Gould is confirmed in his rank.

London Gazette Supplement, December 24th.

The following appointments are made at the War Office :—

Deputy Director.—Bt. Lieut.-Col. I. L. B. Vesey, D.S.O., R.W. Surr. R., from an A.A.G., and to be Temp. Brig.-Gen. whilst so employed, vice Bt. Lieut.-Col. (Temp. Brig.-Gen.) F. H. Sykes, C.M.G., Hrs. ; Nov. 27th.

The following appointments are made :—

Flight Commanders.—From Flying Officers, and to be Temp. Capts. while so employed :—Temp. 2nd Lieut. (Temp. Lieut.) R. E. Bryson, attd. Sco. Rif., and to be transfd. to R.F.C., Gen. List ; Dec. 3rd. 2nd Lieut. (Temp. Lieut.) A. J. Brown, R. Suss. R. (T.F.) ; Dec. 6th. The surname of Capt. W. Smith, M.C., Lond. R. (T.F.), is as now described, and not as in the *Gazette* of Sept. 20th.

Special Appointment.—(Graded as a Flight Comdr.).—Temp. 2nd Lieut. (Temp. Lieut.) W. A. Dunn, Gen. List, a Balloon Comdr., and to be Temp. Capt. while so employed ; Nov. 1st.

Flying Officers.—Temp. Lieut. J. Rees, Gen. List, from a Flying Officer (Obs.) ; Nov. 30th, seniority Oct. 31st, 1916. Temp. 2nd Lieuts. (on prob.), Gen. List, and to be confirmed in their rank :—H. W. McKeague, W. D. G. Murray, C. S. Sheldon ; Sept. 22nd. L. J. Williams ; Oct. 6th. H. E. Hirst ; Nov. 1st, A. J. Davis ; Nov. 7th. H. P. Dawson, D. S. Anderson, R. Milner, G. D. Robin, C. J. Venter ; Nov. 22nd. R. A. Lane, S. Leith, C. R. R. Sefi, J. J. Hargan Nov. 26th. C. B. Henderson, T. H. M. Brown ; Nov. 27th. W. F. J. Harvey' H. L. Christie, D. M. Johns, L. Mortimore, H. D. Schoeman, E. F. Wright ; Nov 28th. C. F. Galbraith, D C. Provan ; Nov. 29th. J. J. Carroll, J. H. F. Baker, J. Palmer, K. T. Campbell, R. Hall, R. Lang, W. A. R. Robertson, W. H. Shell, H. P. Lloyd, E. E. Dafforn, J. G. Edenbrough ; Nov. 30th. The surname of Temp. 2nd Lieut. (on prob.) J. K. Gaukroger, Gen. List, is as now described, and not as in the *Gazette* of Dec. 4th.

Flying Officers (Observers).—Lieut. V. J. Holland, R.F.A. (T.F.), and to be secd. ; June 9th, seniority May 10th. The appointment of Temp. 2nd Lieut. B. B. Muckleston, North'd. Fus., notified in *Gazette* of Nov. 17th, is antedated to Sept. 20th.

Assistant Instructor in Gunnery.—Graded as an Equipment Officer, 3rd Class —Temp. 2nd Lieut. (on prob.) V. W. Lawson, Gen. List, and to be confirmed in his rank ; Dec. 7th.

Adjutant.—The appointment of Capt. E. W. Forbes, M.C., R. War. R. (T.F.) notified in *Gazette* of Nov. 21st, is antedated to Aug. 16th.

Park Commander.—Qrmr. and Hon. Lieut. (Temp. Lieut.-Col.) J. H. Wilford, from a Comdt. of a School of Technical Training (graded as a Depôt Comdr.), relinquishes his temp. rank. and to be Temp. Maj. whilst so employed ; Dec. 7th, seniority Oct. 10th, 1916.

Equipment Officers, 1st Class.—Lieut. F. G. M. Williams, S.R., from the 2nd Class, and to be Temp. Capt. whilst so employed ; Sept. 16th.

3rd Class.—Temp. 2nd Lieut. (on prob.) G. G. Smith, Gen. List, and to be confirmed in his rank ; Sept. 1st. Temp. 2nd Lieut. J. Varley, E. York. R. ; Nov. 8th Lieut. J. Darwen, Canadian A.S.C., Temp. 2nd Lieut. (on prob.) W. Maddison, Gen. List (since deceased), and to be confirmed in his rank ; Nov. 22nd. Qrmr. and Hon. Lieut. A. M. Watson, Shropshire L.I., Temp. Lieut. A. H. Dye, S. Afr. Lab. Corps, Temp. 2nd Lieut. H. S. Askew, Lab. Corps, and to be transfd. to R.F.C., Gen. List, Temp. 2nd Lieut. N. F. Burch, Gen. List ; Dec. 1st.

Schools of Instruction.—School of Bombing.

Instructor.—Graded as an Equipment Officer, 2nd Class.—Temp. 2nd Lieut. (on prob.) W. Moulding, Gen. List, to be confirmed in his rank, and to be Temp. Lieut. whilst so employed ; Oct. 16th.

General List.—Temp. Capt. S. Clare, Garr. Bn., Cam'n Highrs., to be transfd. to R.F.C., Gen. List ; Aug. 11th. Temp. 2nd Lieut. E. B. Tipping relinquishes his commission on account of ill-health contracted on active service, and is granted the hon. rank of 2nd Lieut. ; Dec. 25th. To be Temp. 2nd Lieuts. (on prob.) :—D. H. Daylis ; July 27th. H. R. Soutter ; Nov. 26th. Pte. P. Beaufort, from Lond. R. (T.F.) ; Nov. 29th. J. M. Floyd ; Dec. 3rd. Sgt. F. Boult, from R.F.C., A. F. Rae ; Dec. 4th. Gnr. R. M. Adam, from R.A. ; Dec. 10th. Cpl. F. C. North, from R.E. (T.F.) ; Dec. 12th.

Aeronautical Inspection Department.

London Gazette Supplement, December 20th.

C. H. Piroth to be Temp. Hon. Lieut. whilst employed as Asst. Inspr., Aeronautical Inspn. Dept. ; June 1st.

London Gazette Supplement, December 24th.

To be Temp. Hon. Lieut. : F. Baron, while employed as Assistant Inspector, A.I.D. ; June 1st.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

War Office, December 19th.

"*Salonica.*—British and French aeroplanes carried out a combined raid on the railhead at Cestovo (north-west of Lake Doiran). Considerable damage was caused, and all the Allied machines returned safely. During the operation one of our escorts drove down a hostile aeroplane. Our aircraft have also bombed Topoljani and Mili (east of Seres)."

General Headquarters, December 19th.

"Good work was done in the air on the 17th inst. by the Australian squadrons. Two of their pilots, who were attacked by many hostile scouts when employed on artillery work, succeeded in bringing down one of the enemy machines in our lines and dispersed the remainder.

"On the 18th inst., the thick haze again limited flying to the northern part of the front, where a great deal of artillery and photographic work was done. During the day over 150 bombs were dropped on the enemy's railway stations, sidings, and trenches, and many rounds were fired from the air into his trenches and billets. Fighting in the air on this part of the front was intense all day, and resulted greatly in our favour. Seven hostile machines were brought down by our aeroplanes, one was shot down in our lines by anti-aircraft gun fire, and another by the fire of our infantry. Three other hostile machines were driven down out of control. Three of our aeroplanes are missing. After dark yesterday, our aeroplanes bombed St. Denis Westrem, Roulers, and Lichtervelde aerodromes, and Thourout, Ledeghem, Cambrai, and Menin railway stations. All our machines returned."

General Headquarters, December 20th.

"Although the weather on the 19th inst. was very fine, a dense haze prevented observation by our aeroplanes for artillery. Many photographs were taken, however, of the enemy's aerodromes in back areas, and a few bombs were dropped on his hutments and billets.

"Three hostile machines were brought down in air fighting, and two others driven down out of control. One of our aeroplanes is missing."

Admiralty, December 20th.

"On the night of December 18th a raid was carried out by naval aircraft on Brugeoise works, Bruges. Direct hits were observed on buildings, one of which started a large fire, which was observed by the returning machines to be still burning. Large quantities of explosives were dropped. Another raid was made at noon on December 19th on Vlisseghem aerodrome. Bombs were seen to burst among the sheds round the aerodrome, and several direct hits are reported. One enemy aircraft was destroyed, and another driven down probably out of control. One of our machines is missing."

War Office, December 21st.

"*Mesopotamia.*—Our aeroplanes have been active, and have bombarded with success the Turkish aerodromes at Tuz Khurmatli and in the vicinity of the junction of the Lesser Zab with the Tigris."

General Headquarters, December 23rd.

"On the 22nd inst. when the haze had cleared, our aeroplanes carried out artillery work, and took photographs of the enemy front and back areas. Bombs were dropped on a big gun near Lille and on other targets, including hostile hutments, billets, and trenches. The enemy's infantry were also engaged in their trenches with machine-gun fire, many thousands of rounds being fired by our pilots. In air fighting four hostile machines were brought down. As soon as it was dark our aeroplanes showed greatest activity, bombing the aerodromes of the enemy's night-flying squadrons, as well as important railway stations where activity was observed. In spite of the intense cold several of our pilots made two consecutive flights to one of the enemy's aerodromes, where many hits were obtained on the sheds. All our machines returned."

Admiralty, December 23rd.

"During the night of December 22nd-23rd naval aircraft carried out bombing raids on the following enemy aerodromes :—St. Denis Westrem, Mariakerke, Oostacker. Visibility was excellent, and good shooting was made on all three aerodromes. In all about 6 tons of bombs were dropped. All our machines returned safely."

War Office, December 23rd.

"*Palestine.*—Two and a-half tons of bombs were dropped on the retreating enemy troops (after the capture of Rantieh and Khelbeida Khilbireh), causing many casualties, also on rolling stock and transport with good effect. Six thousand rounds were also fired with machine-guns at the enemy's column at short range. One of their machines was driven down. After two days of rain the weather on the 22nd had become very clear."

War Office, December 24th.

"*Italian Front.*—The General Officer Commanding-in-Chief the British forces in Italy reports that since a portion of the Italian front was taken over by the troops under his command there has been no change in the situation on the British front. Active patrol and counter-battery work has been carried out, and our airmen have given a good account of themselves, but have been hampered by unfavourable weather during the last few days. Some snow has fallen, and the cold is severe, especially in the mountains."

General Headquarters, December 24th.

"On the 23rd inst. a dense haze made little work possible in the air, except bombing and fighting, both of which were carried on with the utmost vigour. The enemy's artillery machines were very active, and five were brought down in air fighting, three of them falling in our lines. Two other hostile machines were brought down in our lines by anti-aircraft gun fire. One of these latter was a large twin-engined machine with three occupants, who were taken prisoner. After dark a thick mist set in which did not lift till the early morning. Our night-flying machines then left the ground and bombed several of the enemy's aerodromes with good effect. In daylight on the 24th inst. one of our squadrons bombed Mannheim-on-the-Rhine with excellent results. A ton of bombs were dropped, and bursts were observed in the large main station, in the works, and also in the town, where fires were started. Very heavy anti-aircraft gunfire was directed against our aeroplanes when over their objective, and one of our machines was damaged and forced to land. Several of the enemy's scouts made repeated attacks on our formations, but were driven off. All of our machines returned, with the exception of the one machine mentioned above."

Admiralty, December 24th.

"During the night of December 23rd-24th bombing raids by naval aircraft were carried out on the following objectives :—Bruges Docks, enemy aerodromes at St. Denis Westrem and Ghistelles. About 3 tons of explosives were dropped on the docks ; and about 1½ tons on the two aerodromes. All machines returned safely."

General Headquarters, December 27th.

"On the 26th inst. a certain amount of flying was done between the snowstorms. Photographs were taken, a few bombs dropped on various targets, and many rounds fired into the enemy's trenches. One hostile machine was brought down. During the night a few machines took advantage of a short fine spell and dropped bombs on the enemy's billets close to the lines. None of our machines are missing."

War Office, December 27th.

"*Italian Front.*—Yesterday enemy made a determined bombing attack on an aerodrome used by British R.F.C. Squadron, apparently, from prisoners'

statements, in retaliation for a recent successful British aeroplane attack on an enemy leave train, which caused many casualties to officers and men. So successful were British and Italian anti-aircraft defences and our own fighting machines, that at least five of the enemy machines were destroyed, and later reports may prove even more. Damage to aerodrome very slight and our losses nil."

War Office, December 28th.

"The Royal Flying Corps effectively attacked in the vicinity of Kulundia (6 miles north of Jerusalem) enemy troops and transport with bombs and machine-gun fire."

General Headquarters, December 28th.

"On the 27th inst. snowstorms again made it impossible to do much flying. A hostile scout machine was brought down in our lines and the pilot captured.

"During the night of the 27th-28th inst. our aeroplanes dropped 240 bombs on four of the enemy's aerodromes round Roulers, and on hostile billets south of Lille. Several trains were also bombed by us, and a direct hit was obtained on one of them.

"None of our machines are missing."

War Office, December 29th.

"The following further information about the bombing raid on Mannheim carried out on December 24th has now been received :—Two of our formations, totalling 10 machines, crossed the line at a height of 9,000 ft. between 10 and 10.15 a.m. The two formations arrived over the objective almost simultaneously, and, in spite of heavy and accurate anti-aircraft fire, dropped their bombs from a height of over 13,000 ft. Sixteen 112 lb. bombs and two 230 lb. bombs were dropped in all, four bursts being observed in the main station, several in the Lanz works, two in Ludwigshafen, and several in the munitions factory between Mundenheim and Rheingonnheim, bursts being partially confirmed by photographs taken at the time. Two formations of enemy aeroplanes were encountered totalling 11 machines, of which, however, only five reached the height of the bombing machines, and these did not attempt to attack at close range. The anti-aircraft defences around Mannheim appeared strong, and brought down one of our machines, which was last seen descending under control. In addition, one of our observers was wounded, but reached home safely. Haze and mist added to the difficulties of the operation, some towns in the Rhine Valley being completely covered."

"*Palestine.*—Our aeroplanes bombed troops and transport on the Nablus road all day on the 28th with great effect."

General Headquarters, December 29th.

"On the 28th inst. the weather was fine with a strong east wind, which late in the afternoon increased almost to a gale. A great many successful photographs were taken by our aeroplanes, and over a hundred bombs were dropped on three of the enemy's aerodromes north of Lille. The enemy's artillery machines were very active, and were repeatedly attacked by our scouts and engaged by our anti-aircraft guns. Seven hostile machines, four of which fell in our lines, were brought down by our aeroplanes, and two others were driven down out of control. Four other hostile machines were shot down by our anti-aircraft guns, three of them falling in our lines. Three of our aeroplanes are missing."

War Office, December 30th.

"*Palestine.*—Enemy troops and transport in the neighbourhood of Jufna, Beitin (Bethel), and El Balua (all on or near the roads leading northwards from Bireh) were successfully bombed and machine-gunned by the Royal Flying Corps."

General Headquarters, December 30th.

"Although the weather was fine on the 29th inst., visibility was bad, and greatly interfered with the co-operation of our aeroplanes and artillery. Much successful photographic work was accomplished, however, and many bombs were dropped on Ingelmunster aerodrome and Staden and other hostile billets. Two hostile machines were brought down in our lines and a third in the enemy's lines. Two other hostile machines were driven down out of control. None of our aeroplanes are missing."

French. *Paris, December 19th.*

"On the night of December 18th German aeroplanes dropped about 50 bombs in the region of Dunkirk. No casualties have been reported up to the present."

Paris, December 20th.

"During the day of the 19th some German aeroplanes dropped bombs in the region of Dunkirk and Calais. Four persons were killed and 10 wounded."

Paris, December 23rd.

"During the period from December 11th to December 20th inclusive, 14 German aeroplanes were brought down by our pilots and three others were compelled to alight within our lines. In addition, on December 5th, 10th and 11th three enemy aeroplanes were brought down by our anti-aircraft gunfire. In the course of the evening of the 22nd, enemy aeroplanes dropped some 40 bombs on Dunkirk and its suburbs. One person belonging to the civilian population was killed and three others were wounded, including a woman and a child."

Paris, December 24th.

"On December 21st, 22nd and 23rd our chaser aeroplanes showed great activity. Our pilots were engaged in about 100 fights, most of them taking place over the German lines. Eighteen German aeroplanes were brought down, of which ten either fell in flames or were destroyed on crashing to the ground. During the same period our bombing squadrons dropped 18,000 kilogrammes (about 18 tons) of bombs on railway stations, munition factories, cantonments, and military buildings of the enemy behind his lines."

Paris, December 25th.

"A German aeroplane was brought down in aerial fighting during the 24th. Another machine, during the evening of the 23rd, was brought down in our lines by the fire of our special guns. On the evening of the 22nd Dunkirk and its environs were bombarded by enemy aeroplanes. Several victims are reported."

Paris, December 27th.

"A German aeroplane was brought down in an air fight during the day on December 24th.

"Our bombing aeroplanes dropped 5,000 kilogrammes of explosives on enemy railway stations and establishments in the region of Rethel and Vouziers."

Paris, December 29th.

"During the night of December 28th-29th our aeroplanes bombarded the railway stations at Mezières-les-Metz and Thionville, as well as the enemy establishments in the region of Vouziers and Rethel."

"*Salonica.*—French and Greek squadrons bombarded and machine-gunned the enemy encampments in the valley of the Vardar."

Paris, December 30th.

"Three German aeroplanes were brought down during the day on December 29th, one of them by the fire of our special guns."

Italian. *Rome, December 20th.*

"A hostile aeroplane was brought down by one of our airmen to the north of Mt. Grappa ; another machine, driven down by anti-aircraft fire, fell in the neighbourhood of Lovadina."

Rome, December 21st.

"During the day of yesterday enemy troops were bombarded with visibly effective results by our Capronis on the Old Piave, and during last night by our dirigibles to the east of Valdobbiadene."

Rome, December 27th.

"A big aerial battle, in which British and Italian chasing squadrons and anti-aircraft artillery participated, was fought yesterday over Treviso. In the morning 25 enemy machines, under cover of the haze, arrived over our aviation camp to the west of the city and commenced to bombard it. The hostile aircraft, received by violent anti-aircraft fire and attacked impetuously by the aeroplanes risen from the camp, were forced to retire before having carried out the operation ; eight enemy machines were brought down. Later, about 12.30 p.m., another hostile squadron of eight machines made the attempt again, but was faced over Montebelluna (behind the British lines on Montello) and forced to retire, losing three machines. Of the 11 enemy aeroplanes brought down, eight fell within our lines and three in the enemy's lines. All our machines returned to their base. The damage produced by the bombardment is insignificant."

Rome, December 28th.

"A powerful squadron of Caproni machines was sent against large hostile forces reported in the Ronchi Valley (at the head of Val Frenzela), and our aircraft bombarded them with very satisfactory results."

Rome, December 29th.

"Yesterday evening at 9 p.m. enemy airmen, true to their innate barbarian impulses, which have been revived by the defeat they suffered on December 26th at Treviso, bombarded the inhabited parts of Treviso, Montebelluna, Castelfranco, and Padua, all open cities.

"In the centre of Padua, where the population is densest and the finest monuments are more numerous, eight bombs were dropped, killing 13 persons and wounding 60. Among the casualties, for the most part women and children, there are only six soldiers. No monument was damaged. There was no damage done or casualties caused in the (? other) cities."

Rome, December 30th.

"Yesterday evening enemy aircraft repeated the raid on Padua, dropping over 20 explosive and incendiary bombs in the city. Three killed, including one child, and three wounded, including one woman, are to be deplored. Much damage, in parts great, was done to the monuments and private dwellings ; buildings and two hospitals were damaged ; a fire broke out in St. Valentino Church, which was hit, and the tower of the Carmine Church has been partly burnt.

"At Pieve di Soligo (on the Soligo, three miles north of its confluence with the Piave) British airmen brought down one of the enemy's captive balloons."

Rome, December 31st.

"The enemy becomes more bitter in his bombardment of open cities. Last night his airmen returned for the third time over Padua, dropping between 9 p.m. and 3 a.m. several score of bombs. Fortunately, owing to the arrangements made by the civil and military authorities, the casualties were only five wounded, including one woman. The rich artistic patrimony of the city instead suffered severely. The façade of the Cathedral was blown down, and the basilica of the "Santo" (the sepulchral church of St. Anthony of Padua) and the Municipal Museum were not a little damaged.

"*Our machines, flying during the night, bombarded very effectively the* enemy's aviation camps at Aviano and La Comina, which they found lighted up, awaiting the return.

"In the night seaplane squadrons respectively bombarded with excellent results enemy aerodromes between Godfgo and S. Fior, and enemy encampments in the vicinity of Torre di Mosto (Livenza).

"British and Italian batteries and airmen co-operated effectively in the action (on Mount Tomba)."

German. *Berlin, December 19th.*

"Lieut. Bongartz obtained his 27th victory in the air."

Turkish. *Constantinople, December 24th.*

"*Palestine.*—Aerial activity is increasing along the whole front."

Constantinople, December 22nd.

"Bombs dropped by enemy airmen on Jericho had no effect. For the rest the stormy weather restricted aerial activity on the whole of the front."

◈ ◈ ◈ ◈

Fatal Accidents.

A VERDICT of "Accidental Death" was returned on December 22nd at an inquest held at Ilford on Lieut. V. C. Manuel, R.F.C., who met his death at an Essex aerodrome. He was coming down after a flight, when his machine got into a spin and crashed to the ground. He died almost immediately.

2nd Lieut. C. H. Hoskyns-Abrahall, R.F.A. and R.F.C., was accidentally killed while making a solo flight in Wiltshire on December 22nd.

"Accidental Death" was the verdict at the inquest at a sea coast town on John Cook, R.F.C., who was killed by being struck by the propeller of an aeroplane.

Lieut. A. E. Mott, R.F.C., fell with his machine in the sea on December 24th, and both aeroplane and aviator sank.

Early on the morning of December 24th an aeroplane fell from a great height on some golf links in Yorkshire. The machine was smashed, and the pilot, 2nd Lieut. H. N. S. Anderson, R.F.C., died at the local cottage hospital from his injuries.

A verdict of "Accidental Death" was returned at the inquest on Flight Sub-Lieut. V. Hatherton Littleboy, R.N.A.S., who was killed in a seaplane accident at a south coast port on December 22nd. His machine nose-dived from a height of about 200 ft.

2nd Lieut. C. C. A. Norris, R.F.C., within a couple of hours of getting his "wings," was solo flying in Norfolk when his machine was caught in a sudden, violent hailstorm. It turned over and crashed to earth, Norris being killed.

Lieut. Leslie James Mitchell, R.F.C., while solo flying, was killed through his machine side-slipping.

FLIGHT

INTERNATIONAL AIRCRAFT STANDARDS.

(*Continued from page* 1368, *December 27th*, 1917.)

3N8—*Specifications for Sheet Copper.*

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. (*a*) The copper used shall be lake or lectrolytic, conforming with the I.A.S.B. specifications 2N2, and shall be hot rolled or hot rolled and finished by cold rolling and annealing or by final cold rolling as required.

(*b*) Chemical analysis shall not be required; but samples may be taken for analysis to check the quality of the material used, in which case the sheet, after being thoroughly cleaned from all oxide and dirt, must show a purity of 99.85 per cent. copper plus silver.

WORKMANSHIP AND FINISH.—3. The material shall be clean, smooth, or uniform colour, and shall be free from all injurious defects.

PHYSICAL PEOPERTIES AND TESTS.—4. (*a*) The sheets shall have the following physical properties:

TENSILE TESTS.

Grade.	Minimum tensile strength.	Minimum elongation in 2 inches (50.8 mm.)
Soft	30,000 pounds per square inch (21.09 kg./mm.²)	25 per cent.
Hard ..	35,000 pounds per square inch (24.61 kg./mm.²)	18 per cent.

(*b*) Sheets less than 0.072 ins. (1.83 mm.) thick are not subject to physical test.

(*c*) The tensile strength of hard-rolled thin sheets will be considerably more and the elongation considerably less than that indicated in the above table.

Bend Test.—(*d*) The soft sheets must withstand bending flat on themselves in any direction without cracking.

SELECTION OF TEST SPECIMENS.—5. One test shall be taken from each lot of 500 lbs. (226.8 kg.) or less.

DIMENSIONS AND TOLERANCES.—6. (*a*) The weight or thickness shall not vary more than 5 per cent. from that specified. Thickness shall be specified in decimals of an inch or millimetre and shall correspond to the ordinary gauge numbers.

(*b*) For wide sheets or plates above 48 ins. (1,219 mm.), to and including 60 ins. (1,524 mm.), a tolerance of 5 per cent. over or 7 per cent. under gauge or weight will be allowed.

(*c*) For extra wide sheets or plates above 60 ins. (1,524 mm.) in width the tolerance may be 5 per cent. over or 8 per cent. under gauge or weight.

(*d*) For the purpose of calculating weights, etc., the specific gravity of copper shall be taken as 8.80 at 20 deg. C., or 0.3212 lbs. per cubic inch (8.89 g. per cm.³).

DELIVERY, PACKING, AND SHIPPING.—7. (*a*) When orders call for 12-ft. (3.66-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 40 per cent.:

40 per cent. may be 10 ft. (3.05 metres) or over.
30 per cent. may be 8 ft. (2.44 metres) to 10 ft. (3.05 metres).
20 per cent. may be 6 ft. (1.83 metres) to 8 ft. (2.44 metres).
10 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).

When orders call for 10-ft. (3.05-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 40 per cent.:

40 per cent. may be 8 ft. (2.44 metres) or over.
30 per cent. may be 6 ft. (1.83 metres) to 8 ft. (2.44 metres).
20 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).
10 per cent. may be 2 ft. (0.61 metre) to 4 ft. (1.22 metres).

When orders call for 8-ft. (2.44-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 30 per cent.:

30 per cent. may be 6 ft. (1.83 metres) or over.
20 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).
10 per cent. may be 2 ft. (0.61 metre) to 4 ft. (1.22 metres).

When orders call for 6-ft. (1.83-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 20 per cent.:

20 per cent. may be 4 ft. (1.22 metres) or over.
10 per cent. may be 2 ft. (0.61 metre) to 4 ft. (1.22 metres).

(*b*) Below 1 in. (25.4 mm.) wide sheet copper may be furnished in rolls or coils, in which case it will be cold rolled or cold rolled and annealed.

3N9—*Specification for Phosphor-Bronze Strip.*

GENERAL.—1. The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

USE.—2. This strip to be used for springs.

MATERIAL.—3. (*a*) The bronze shall conform to the following chemical composition:

	Per cent.
Copper	91 to 93
Zinc, maximum	0.20
Iron, maximum	0.10
Phosphorus, maximum	0.15
Tin	Remainder.

(*d*) Drillings or clippings for analysis shall be taken from both ends of the coil sampled and shall be free from all surface oxide or dirt.

MANUFACTURE.—4. (*a*) The bronze shall be crucible melted from lake or electrolytic copper, according to I.A.S.B. specification 2N2 and best Straits' or equivalent tin and deoxidised with phosphorus.

(*b*) No scrap shall be used except such as may accumulate in the manufacturer's plants from material of the same composition and of their own make.

(*c*) All strip shall be rolled to spring temper unless otherwise ordered.

WORKMANSHIP AND FINISH.—5. The surface of the strip shall be clean and smooth, and it shall be free from injurious defects such as blisters, slivers, or dirt embedded in the surface.

PHYSICAL PROPERTIES AND TESTS.—6. Phosphor-bronze spring strip shall have the following physical properties:

Tensile Strength.	Yield Point.	Elongation in 2 ins. (50.8 mm.).
Minimum, 85,000 lbs. per sq. in. (59.76 kg./mm².).	65,000 lbs. per sq. in. (45.70 kg./mm².).	5 per cent.
Maximum, 115,000 lbs. per sq. in. (80.85 kg./mm².).	95,000 lbs. per sq. in. (66.79 kg./mm².).	20 per cent.

SELECTION OF TEST SPECIMENS.—7. When shipments are made in coils, a specimen from every tenth coil shall be taken for physical tests. When shipments are made in short lengths, a specimen will be taken from each case.

DIMENSIONS AND TOLERANCES.—8. The tolerances allowed shall be as given in the following table:

TOLERANCES.

ENGLISH UNITS.

American Wire Gauge (B. & S.).	Thickness, inches.	Tolerance, inches. Less than 5 ins. wide	5 to 8 ins. wide.	8 to 11 ins. wide.	11 to 14 ins. wide.
No. 8 to 14	0.1285 to 0.0641	±0.0029	±0.0033	±0.0036	±0.0040
No. 15 to 18	0.0571 to 0.0403	±0.0023	±0.0029	±0.0033	±0.0037
No. 19 to 24	0.0359 to 0.0201	±0.0020	±0.0024	±0.0028	±0.0032
No. 25 to 28	0.0179 to 0.0126	±0.0016	±0.0020	±0.0024	±0.0028
No. 29 to 32	0.0113 to 0.0080	±0.0013	±0.0017	±0.0020	±0.0024

METRIC UNITS.

American Wire Gauge (B. & S.).	Thickness, millimetres	Tolerance, millimetres. Less than 127 mm. wide.	127 to 203 mm. wide.	203 to 279 mm. wide.	279 to 356 mm. wide.
No. 8 to 14	3.264 to 1.628	±0.074	±0.084	±0.091	±0.102
No. 15 to 18	1.450 to 1.024	±0.064	±0.074	±0.084	±0.094
No. 19 to 24	0.912 to 0.511	±0.051	±0.061	±0.071	±0.081
No. 25 to 28	0.455 to 0.321	±0.041	±0.051	±0.061	±0.071
No. 29 to 32	0.286 to 0.202	±0.033	±0.043	±0.051	±0.061

DELIVERY, PACKING, AND SHIPPING.—9. (*a*) When orders call for 12-ft. (3.66-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 40 per cent.:

40 per cent. may be 10 ft. (3.05 metres) or over.
30 per cent. may be 8 ft. (2.44 metres) to 10 ft. (3.05 metres).
20 per cent. may be 6 ft. (1.83 metres) to 8 ft. (2.44 metres).
10 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).

When orders call for 10-ft. (3.05-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 40 per cent.:

40 per cent. may be 8 ft. (2.44 metres) or over.
30 per cent. may be 6 ft. (1.83 metres) to 8 ft. (2.44 metres).
20 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).
10 per cent. may be 2 ft. (0.61 metres) to 4 ft. (1.22 metres).

When orders call for 8-ft. (2.44-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 30 per cent.:

30 per cent. may be 6 ft. (1.83 metres) or over.
20 per cent. may be 4 ft. (1.22 metres) to 6 ft. (1.83 metres).
10 per cent. may be 2 ft. (0.61 metre) to 4 ft. (1.22 metres).

When orders call for 6-ft. (1.83-m.) lengths, the following tolerances as to lengths will be allowed, but in no case shall the aggregate amount of these short lengths exceed 20 per cent.:

20 per cent. may be 4 ft. (1.22 metres) or over.
10 per cent. may be 2 ft. (0.61 metre) to 4 ft. (1.22 metres).

(*b*) Coils shall not contain more than four lengths, and lengths shall be at least 10-ft (3.05 m.) long.

3S13—*Specifications for 19 Nonflexible Steel-Wire Cables.*

GENERAL.—1. (*a*) This specification covers the finish, material, and construction of high strength steel-wire cable composed of steel wires twisted concentrically about a steel wire as centre.

(*b*) The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. The wire shall be manufactured of either I.A.S.B. standard steel No. 1065, No. 1070, or No. 1080, the compositions of which are listed below.

MANUFACTURE.—3. (*a*) The steel wires composing the cable shall be laid around the centre wire in one or two layers as required by the number of wires in the cable with a left-hand (counter-clockwise) pitch and with a length of lay not to exceed 11 times the diameter of the cable or not less than 9 times the diameter of the cable.

(*b*) The steel from which the wires composing the cable are drawn shall be manufactured by the acid open-hearth process.

(*c*) Wires composing the cable shall be uniformly coated with pure tin to solder readily.

(*d*) Joints in wires composing the cable shall be brazed in a gas fire. Tucked in, welded, or twisted joints will not be permitted. No two brazed joints in individual wires shall be closer to one another in the completed cable than 150 feet (45.72 m.). All brazed joints in wires shall be tinned. Exposed brass at joints shall not constitute cause for rejection.

WORKMANSHIP AND FINISH.—4. Each length of cable is to be evenly laid and free from kinks, loose wires, or other irregularities. The cable shall remain in this condition when unwound from the reel or bent around a standard thimble, proper precautions being taken to secure the ends.

PHYSICAL PROPERTIES AND TESTS: *Tensile Test.*—5. (*a*) A tensile test shall be made upon each reel of cable purchased of a size.

(*b*) Samples of cable for testing tensile strength shall be not less than 24 ins. (610 mm.) in length. In making tensile tests the distance between jaws of testing machine, with sample in place and before set, shall be not less than 10 ins. (254 mm.).

(*c*) Samples for tensile test may be clamped in the jaws of the testing machine in the usual manner to facilitate testing, but in case of failure or dispute on individual tests, and at the request of the manufacturer, check tests shall be made by socketing the samples with pure zinc.

(*d*) Cable for use in the construction of aircraft shall meet the required breaking strength specified in the table.

Bend Test.—(*e*) One bend test is to be made on a sample cut from each reel of cable of a given size. Each sample must be bent once around its own diameter and straightened again at least 20 times in succession in the same direction of bending without any of the wires breaking.

Torsion Test.—(*f*) A torsion test is to be made on one wire from each sample of cable taken for tensile test. The wire is to be gripped by two vices 8 ins. (203 mm.) apart. One vice shall be turned uniformly at as high a rate of speed as possible without perceptibly heating the wire; one vice shall have free axial movement in either direction.

(*g*) The number of complete turns which the wire shall stand is determined by the formula:

$$\text{Number of turns} = \frac{2.2}{\text{diameter in inches}} = \frac{55.9}{\text{diameter in millimetres.}}$$

(*h*) Failure of one piece of wire to show full number of turns specified in the above torsion test shall not be considered cause for rejection, but in such case two additional tests shall be made on two more wires from the same sample of cable, and if both samples meet the requirements of the specification the cable shall be accepted in this respect.

DIMENSIONS AND TOLERANCES.—6. There shall be no permissible variation in gauge below size. Cable having a diameter of 0.031 ($\frac{1}{32}$) to 0.156 ($\frac{5}{32}$) inch (0.79 to 3.97 mm.), inclusive, shall have a permissible variation of 10 per cent. above size, and cable having a diameter of 0.187 ($\frac{3}{16}$) to 0.375 ($\frac{3}{8}$) inch 4.76 to 9.53 mm.), inclusive, shall have a permissible variation of 7 per cent. above size.

DELIVERY, PACKING, AND SHIPPING.—7. (*a*) All cable shall be shipped on reels in lengths and sizes as specified on orders.

(*b*) The dimensions of reels for different lengths and sizes of cable shall conform to the table attached to this specification.

(*c*) A tinned or galvanised steel seal wire of approved design shall pass around no less than three convolutions of the cable on the reel and shall pass through a linen tag showing the name of the manufacturer, the size and length of cable on the reel, the order number or other distinguishing marks, and a record of the test for tensile strength. A lead seal impressed with the official stamp of the representative of the Government making the inspection shall secure the ends of this seal wire and furnish evidence of inspection and acceptance.

(*d*) The outer layers of cable on a reel ready for shipment shall be protected from mechanical injury in handling and transportation by an efficient covering of burlap.

CHEMICAL COMPOSITION OF STANDARD CARBON STEELS.

Number.	Carbon.	Manganese.	Phosphorus, maximum.	Sulphur, maximum.
1065	0.60–0.70	0.50–0.70	0.040	0.045
1070	0.65–0.75	0.50–0.70	0.040	0.045
1080	0.75–0.90	0.25–0.50	0.040	0.045

TABLE OF WEIGHTS, SIZES, AND STRENGTHS OF CABLE.

English Units.			Metric Units.		
Diameter, inches.	Breaking strength, pounds.	Approximate weight, pounds per 100 ft.	Diameter, millimetres	Breaking strength, kilograms.	Approximate weight, kilograms per 100 metres.
0.312 (5/16)	12,500	20.65	7.938	5,670	30.72
0.250 (1/4)	8,000	13.50	6.350	3,629	20.09
0.218 (7/32)	6,100	10.00	5.556	2,767	14.88
0.187 (3/16)	4,600	7.70	4.763	2,087	11.46
0.156 (5/32)	3,200	5.50	3.969	1,451	8.18
0.125 (1/8)	2,100	3.50	3.175	953	5.21
0.109 (7/64)	1,600	2.60	2.778	726	3.87
0.094 (3/32)	1,100	1.75	2.381	498.9	2.60
0.078 (5/64)	780	1.21	1.984	353.8	1.80
0.062 (1/16)	500	0.78	19588	226.8	1.16
a0.031 (1/32)	185	0.30	a0.794	83.9	0.45

*a*7 wire.

REELS FOR CABLE.

ENGLISH UNITS.

Diameter of cable.	Diameter of head.	Traverse or distance between heads.	Diameter of bundle.	Diameter of arbor hole.	Diameter of head.	Traverse or distance between heads.	Diameter of bundle.	Diameter of arbor hole
		1,000 feet.				3,000 feet.		
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1/32	12	4	8	1½	12	4	8	1½
1/16	12	4	8	1½	12	4	8	1½
5/64	12	4	8	1½	16	4	10	1½
3/32	12	4	8	1½	16	4	10	1½
7/64	16	4	10	1½	16	7	12	1½
1/8	16	4	10	1½	16	7	12	1½
9/64	16	7	12	1½	16	10	8	1½
5/32	16	7	12	1½	16	10	8	1½
3/16	18	7	12	2½	18	10	8	2½
7/32	18	7	12	2½	18	10	8	2½
1/4	18	10	10	2½	24	10	10	2½
5/16	18	10	10	2½	24	10	10	2½
11/32	18	10	8	2½	32	16	16	2½
3/8	18	10	8	2½	32	16	16	2½

METRIC UNITS.

Mm.	Mm.	305 metres. Mm.	Mm.	Mm.	Mm.	914 metres. Mm.	Mm.	Mm.
0.794	305	102	203	28.58	305	102	203	28.58
1.588	305	102	203	28.58	305	102	203	28.58
1.984	305	102	203	28.58	406	102	254	28.58
2.381	305	102	203	28.58	406	102	254	28.58
2.778	406	102	254	28.58	406	178	305	28.58
3.175	406	102	254	28.58	406	178	305	28.58
3.572	406	178	305	28.58	406	254	203	28.58
3.969	406	178	305	28.58	406	254	203	28.58
4.763	457	178	305	53.98	457	254	203	53.98
5.556	457	178	305	53.98	457	254	203	53.98
6 350	457	254	254	53.98	610	254	254	53.98
7.938	457	254	254	53.98	610	254	254	53.98
8.731	457	254	203	53.98	813	406	406	53.98
9.525	457	254	203	53.98	813	406	406	53.98

ENGLISH UNITS.

Diameter of cable.	Diameter of head.	Traverse or distance between heads.	Diameter of bundle.	Diameter of arbor hole.	Diameter of head.	Traverse or distance between heads.	Diameter of bundle.	Diameter of arbor hole.
		5,000 feet.				10,000 feet.		
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1/32	12	4	8	1½	16	4	10	1½
1/16	16	4	10	1½	16	7	12	1½
5/64	16	7	12	1½	16	10	8	1½
3/32	16	7	12	1½	16	10	8	1½
7/64	16	10	8	1½	18	10	8	1½
1/8	16	10	8	1½	24	10	10	1½
9/64	24	10	10	1½	24	16	10	1½
5/32	24	10	10	2½	24	16	10	2½
3/16	24	10	10	2½	24	16	10	2½
7/32	24	10	10	2½	32	20	16	3½
1/4	32	18	16	2½	36	22	18	3½
5/16	32	18	16	2½	36	22	18	3½
11/32	32	20	16	3½	50	16	26	3½
3/8	32	20	16	3½	50	16	26	3½

METIC UNITS.

1,524 metres.						3,048 metres.		
Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
0.794	305	102	203	28.58	406	102	254	28.58
1.588	406	102	254	28.58	406	178	305	28.58
1.984	406	178	305	28.58	406	254	203	28.58
2.381	406	178	305	28.58	406	254	203	28.58
2.778	406	254	203	28.58	457	254	203	28.58
3.175	406	254	203	28.58	610	254	254	28.58
3.572	610	254	254	28.58	610	406	254	53.98
3.969	610	254	254	28.58	610	406	254	53.98
4.763	610	254	254	53.98	610	406	254	53.98
5.556	610	254	254	53.98	813	508	406	79.38
6.350	813	457	406	53.98	914	560	457	79.38
7.938	813	457	406	53.98	914	560	457	79.38
8.731	813	508	406	79.38	1,270	406	660	79.38
9.525	813	508	406	79.38	1,270	406	660	79.38

In making racks for the above reels allow a 4-in. or 102-mm., greater width than the traverse specified below.

2N1.—Specifications for Ingot Aluminium.

GENERAL.—The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. (*a*) Three grades of ingot aluminum are recognized :

	Per cent.
Standard No. 1, aluminium	not less than 99.0
Standard No. 2, aluminium	,, 98.0
Special, aluminium	,, 99.5

Analysis.—(*b*) One sample ingot of each heat shall be taken for analysis, and in any case not less than one sample ingot from each 500 lb. (226.8 kg.) of metal.

(*c*) Samples shall be obtained by drilling completely through the ingot or half through from top to bottom. The weight of the samples obtained by drilling the ingot or ingots should not be less than 120 grams.

MANUFACTURE.—3. No scrap shall be used except such as shall accumulate at the manufacturer's plant from material of the same composition and of their own make.

3S14.—Specification for 7 × 7 Flexible Steel-Wire Cable.

GENERAL.—1. (*a*) This specification covers the finish, material, and construction of high-strength steel-wire cable composed of steel wires twisted concentrically around a steel-wire centre, thus forming a strand, and such strands twisted concentrically around a central strand of the same construction, forming a cable.

(*b*) The general specifications, 1G1, shall form, according to their applicability, a part of these specifications.

MATERIAL.—2. The wire shall be manufactured of either I.A.S.B. standard steel, No. 1065, No. 1070, or No. 1080, the compositions of which are listed below.

MANUFACTURE.—3. (*a*) The steel wires composing the individual strands of the cable shall be laid concentrically around the centre wire in one layer of six wires with a left-hand (counter-clockwise) pitch or lay. The cable itself shall be constructed by twisting six of these strands composed of seven wires each around a seventh strand of the same construction and material with a right-hand (clockwise) pitch and with a length of lay of six to eight times the diameter of the whole.

(*b*) The steel from which the wires composing the cable are drawn shall be manufactured by the acid open-hearth process.

(*c*) Wires composing the cable shall be uniformly coated with pure tin to solder readily.

(*d*) Joints in wires in cable having a diameter of 0.156 ($\frac{5}{32}$) inch (3.969 mm.) and larger shall be brazed in a gas fire. In cable having a diameter of 0.125 ($\frac{1}{8}$) inch (3.175 mm.) or less, wires may be joined either by brazing or twisting, at the manufacturer's convenience. Tucked-in or welded joints are not permitted. No two joints in individual wires shall be closer to one another in the completed cable than 30 ft. (9.14 m.). All brazed joints shall be tinned. Exposed brass at joints shall not constitute cause for rejection.

WORKMANSHIP AND FINISH.—4. Each length of cable is to be evenly laid, and free from kinks, loose wires, or other irregularities. The cable shall remain in this condition when unwound from the reel or bent around a standard thimble, proper precautions being taken to secure the ends.

PHYSICAL PROPERTIES AND TESTS.—*Tensile test.*—5 (*a*) A tensile test shall be made upon each individual reel of cable purchased of a size.

(*b*) Samples of cable for testing for tensile strength shall be no less than 24 ins. (610 mm.) in length. In making tests the distance between jaws of testing machine with sample in place and before test shall be not less than 10 ins. (254 mm.).

(*c*) Samples for tensile test may be clamped in the jaws of the testing machine in the usual manner to facilitate testing; but in case of failure or dispute on individual tests and at the request of the manufacturer check tests shall be made by socketing the samples with pure zinc.

(*d*) Cable for use in the construction of aircraft shall meet the required breaking strength specified in the table.

Bend Test.—(*e*) One bend test is to be made on a sample cut from each reel of cable of a given size. Each sample must be bent once around its own diameter and straightened again at least 20 times in succession in the same direction of bending without any of the wires breaking.

Torsion Test.—(*f*) A torsion test is to be made on one wire from each sample of cable for tensile test. The wire is to be gripped by two vices 8 ins. (203 mm.) apart. One vice shall be turned uniformly at as high a rate of speed as possible without perceptibly heating the wire. One vice shall have free axial movement in either direction.

(*g*) The number of complete turns which the wire shall stand is determined by the formula :

$$\text{Number of turns} = \frac{2.2}{\text{diameter in inches}} = \frac{55.9}{\text{diameter in millimetres.}}$$

(*h*) Failure of one piece of wire to show full number of turns specified in the above torsion test shall not be considered cause for rejection, but in such case two additional tests shall be made on two more wires from the same sample of cable, and if both samples meet the requirements of the specifications the cable shall be accepted in this respect.

DIMENSIONS AND TOLERANCES.—6. There shall be no permissible variation in gauge below size. Cable having a diameter of $\frac{1}{16}$ to $\frac{3}{32}$ ins. (1.59 to 2.38 mm.), inclusive, shall have a permissible variation of 12 per cent. above size; cable having a diameter of $\frac{1}{8}$ to $\frac{3}{16}$ in. (3.18 to 4.76 mm.), inclusive, shall have a permissible variation of 10 per cent. above size; and cable having a diameter of $\frac{7}{32}$ to $\frac{3}{8}$ in. (5.56 to 9.53 mm.), inclusive, shall have a permissible variation of 7 per cent. above size.

DELIVERY, PACKING, AND SHIPPING.—7. (*a*) All cable shall be shipped on reels in lengths as specified on orders.

(*b*) The dimensions of reels for different lengths and sizes of cable shall conform to the table attached to this specification.

(*c*) A tinned or galvanised steel seal wire of approved design shall pass around no less than three convolutions of the cable on the reel and shall pass through a linen tag showing the name of the manufacturer, the size and length of cable on the reel, the order number or other distinguishing marks, and a record of the test for tensile strength. A lead seal impressed with the official stamp of the representative of the Government making the inspection shall secure the ends of this seal wire and furnish evidence of inspection and acceptance.

(*d*) The outer layer of cable on a reel ready for shipment shall be protected from mechanical injury in handling and transporting by an efficient covering of burlap.

(To be continued.)

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Aircraft Precision Tools.

LORD LENTERDEN drew attention in the House of Lords the other day to the matter of the supply of precision tools to firms engaged in the production of aircraft. Lord Elphinstone, replying for the Minister of Munitions, was officially vague, and practically contented himself with asserting that the position of the " small tool " trade was quite satisfactory and that the machine tool trade was in exactly the same condition. All we can say about it is that if these trades are, as the noble lord says, in a perfectly satisfactory state and able to supply existing demands, there must be something very wrong between the works in which tools of precision are made and the works in which they are designed to be used. If Lord Elphinstone is right, then some enquiries ought to be set on foot with a view to the discovery of what becomes of the tools after they have been made and have left the makers' works. One thing is certain : that they do not appear with any marked celerity in the places in which they are designed to be used. On the contrary, we hear, from time to time, harrowing stories of work delayed in a heartbreaking manner by the failure of the Ministry of Munitions, or its nominees, to deliver the necessary tools. Moreover these cases are not isolated. They are quite usual—at any rate usual enough to give us to wonder who has been pulling Lord Elphinstone's leg !

Casualties.

Major ROBERT EGERTON, M.C., Royal Irish Fusiliers and R.F.C., who was killed on December 23rd, was the third son of Sir Reginald Arthur Egerton, C.B., and Lady Egerton, of 29, Brompton Square, S.W., and was born in 1892. He was educated at the Oratory School, Birmingham, and at the Royal Military College, Sandhurst, and entered the 2nd Royal Irish Fusiliers in 1913, joining his regiment in India in that year. He proceeded from India with his regiment to the front in November, 1914, where he took part in much fighting, and was twice mentioned in despatches. In March, 1915, he was awarded the Military Cross "for gallantry, ability, and useful reconnaissance work on many occasions at great personal risk. By the gallant leading of his platoon at St. Eloi he prevented the advancing enemy from taking an important position, and later rendered very material assistance in the reconnaissance prior to our counter-attack." He was shortly afterwards invalided home, and, being pronounced by a medical board as unfit for trench work for a time, he devoted the interval to learning to fly, and speedily obtained his "wings," and was appointed a flying officer in the R.F.C. He was gazetted a flight commander on March 3rd, 1916, with the rank of captain, and on November 23rd of the same year a squadron commander with the rank of major. At the time of his death he was in command of a squadron.

Second Lieutenant F. G. FLOWER, R.F.C., killed on December 18th, was the fourth son of the Rev. and Mrs. F. W. Flower, of Oporto, Portugal, and was aged 23. He was born in Oporto, and educated at Richmond Hill School, Richmond, Surrey. After spending several years in Montreal, he volunteered for general service in 1915 with a Canadian Siege Battery, proceeding to France in the following year. He subsequently obtained a commission in the R.F.C. as pilot. He was a brother of Second Lieutenant A. C. Flower, Grenadier Guards, who was killed in October, 1916.

Second Lieutenant RONALD PATON HOOD, R.F.C., who was reported missing on September 28th, was last seen in a fight in the air, and news of his death on that date has now been confirmed. He was the younger of the two sons of Mr. and Mrs. Thomas M. Hood, of Rio de Janeiro, and his elder brother was killed on April 14th. Born in Pernambuco, Mr. Hood was educated at Forest School and Felsted, and on leaving school he at once joined the Artists' Rifles in September, 1915, receiving his commission in the R.F.C. last April. He went to the front in May.

Flight Commander (Acting Lieutenant R.N.), WILLIAM FRITH HORNER, R.N., who was drowned at sea whilst on active service, on the night of December 21st, aged 22, was the only son of Leonard and Annie Marion Horner, of Wayside, Warlingham, Surrey, and grandson of Isaline Marion Blew, of the same address.

Lieutenant-Commander RALPH MICHAEL MACK, R.N., who was killed off the Dutch coast on December 23rd, aged 34 years, was the younger son of Captain Hugh Paston Mack, R.D.C., and Mrs. Mack, Mundesley, Norfolk.

Second Lieutenant J. T. ORRELL, R.F.C., who was killed in action on December 2nd, aged 20, was the only son of Mr. and Mrs. J. T. Orrell, Fairfield, Manchester, and grandson of the late Percy Orrell, of Openshaw.

Lieutenant REGINALD BENADE GLENDOWER OTTLEY, R.F.C., who was killed on December 23rd, aged 21, was the last surviving son of Mr. and Mrs. Glendower Coghill Ottley, of 5, Cambridge Court, East Twickenham, Middlesex, whose two other sons have lost their lives in this war, and grandson of Major-General C. G. Ottley, Madras Army.

Lieutenant WILLIAM LEFEVRE OXLEY PARKER, Hussars, attached R.F.C., who was killed on October 31st, aged 22, was the younger son of Mr. and Mrs. Parker, of Faulkbourne Hall, Essex, and a grandson of the late John Oxley Parker and the late Sir William Farrer. He was educated at Ludgrove, Eton (Mr. C. M. Wells's house), and Oriel College. He was in the O.T.C. at Eton and Oxford, and had been a year at Oxford when war was declared. He immediately received orders to join the Hussars, to the Special Reserve of which regiment he had been gazetted ten days previously. He left for France in September, 1915, and was wounded in July, 1916. Last June he was attached to the R.F.C., and went to the front in July.

Lieutenant STANLEY WILLIAM ROWLES, A.S.C., attached R.F.C., of Norham, Oatlands Park, Weybridge, Surrey, who died on December 13th from wounds received whilst flying on December 3rd, was the brother of Lieutenant W. J. Rowles, of H.M.S. "Cyclops," and cousin of T. S. Harris, 4, Lloyd's Avenue, E.C., and Hamerton, Addiscombe Grove, Croydon. His age was 27.

Flight Sub-Lieutenant VERNON HATHERTON, R.N.A.S., who was accidentally killed whilst flying on December 22nd, aged 22, was the son of Mrs. J. Littleboy, of Woking.

Second Lieutenant CHRISTOPHER HENRY HOSKYNS-ABRAHALL, R.F.A., attached to the R.F.C., was accidentally killed while flying alone on December 22nd at Yatesbury, Wilts. He was the younger son of Major C. H. Hoskyns-Abrahall, R.M.L.I., who was killed in Gallipoli in 1915, and nephew of Major J. H. Hoskyns-Abrahall, late R.M.L.I., of Malvern, Tavistock. He was educated at Kelly College, Tavistock, from which he passed into Woolwich in 1915, in his 17th year. He was gazetted second lieutenant in the R.F.A. the following year, and was attached to the R.F.C. some months ago.

Second Lieutenant LESLIE JAMES MITCHELL, R.F.C., who was killed in an aeroplane accident on December 21st, was the elder and only surviving son of Mr. and Mrs. James Mitchell, of Belmont, Surrey.

Lieutenant MERRICK ORVILLE PRISMALL, R.F.A. and R.F.C., second son of Lieutenant-Colonel E. Prismall, T.D. (attached General Staff Canadian Oversea Forces), was killed as the result of an aeroplane accident while flying near Grantham on December 20th, aged 25 years. He was educated at St. Edmund's College, Old Hall, and served for a short time in the Windsor Troop of the Berkshire Yeomanry. He left England at the age of 18 to explore, and visited Queensland, Northern Territories of Australia, New Zealand, the back blocks of New South Wales, Natal, Orange Free State, and Cape Colony. In 1913 he was serving in the 2nd South African Mounted Rifles, and had his thigh shattered at Estcourt as the result of a gunshot wound. In 1914 he served through the Moritz Rebellion and afterwards through the German South-West African campaign under General Botha. On reaching Windhoek, at the end of this campaign, he applied for service in France, and returning to England, received a commission in the R.F.A. He went to France early in 1916, and was wounded at the Somme. Last February he joined the R.F.C., and served as an observer for six months. After 18 months' service in France he returned to England last September, and married Miss Marie Comerford, of Woodford Green, Essex.

Married.

On December 16th, at St. Mary Abbot's, Kensington, Second Lieutenant T. H. C. BANNISTER, R.F.C., son of the late Thomas Bannister, J.P., was married to ANNIE, widow of Colonel James MINOGUE, West Yorkshire Regiment, daughter of the late Hilton Philipson, J.P., and Foundress and Commandant of Mornington Lodge War Hospital for Officers.

On December 19th, at St. Nicholas Church, Newport, Salop, Captain W. D. BUDGEN, Leinster Regiment, attached R.F.C., was married to EVELYN BRIDGETT, youngest daughter of the late R. N. HEANE and Mrs. HEANE, of Newport.

On December 20th, at Richmond, Surrey, ARNALL W. CAMP, R.F.C., eldest son of Llewellyn E. Camp, J.P., of Queensmead, Richmond, was married to JEAN HENDERSON, daughter of Mr. and Mrs. G. A. Henderson, of Cochrane, Ontario.

On December 27th, at the Catholic Church, Petersfield, Lieutenent, ERIC C. L. COPNER, the Devon Regiment and R.F.C., was married to PAULA, youngeat daughter of the late Maître FLORIZOONE, of Bruges.

Major the Right Hon. Sir JOHN SIMON, K.C.V.O., K.C., M.P., who is now a major on the staff of the Royal Flying Corps, was married in Paris last month to Mrs. Manning.

On the 19th inst., at St. Mary's Parish Church, Wimbledon Lieutenant E. S. DUGGAN, R.F.C., youngest son of Mr. and Mrs. E. H. Duggan, of Toronto, was married to GLADYS EDITH, daughter of Mr. and Mrs. S. C. SHEPPARD, Atherton Grange, Wimbledon, late of Rio de Janeiro. (South American papers, please copy.)

On the 18th December, at the Parish Church of S. Paul, Cullercoats, Captain HARTLEY FRENCH, West Yorkshire Regiment and Royal Flying Corps (Staff), only son of Mr. and Mrs. HARTLEY FRENCH, Jun., of Sunderland, was married to RUBY, youngest daughter of Mrs. and the late Mr. ROBERT MARSON, of Whitley Bay.

On December 20th, at Christ Church, Sheffield, Second Lieutenant H. F. FULFORD, R.E., attached R.F.C., was married to EDITH MARY, daughter of Dr. LONGBOTTOM.

On December 27th, at St. John's, Dewsbury Moor, Lieutenant GEOFFREY MILNER, R.E., attached R.F.C., youngest son of Mr. and Mrs. John Milner, Savile Town, Dewsbury, was married to KATHLEEN ISABEL, eldest daughter of Mr. and Mrs. C. L. W. NICHOLSON, St. Heliers, Dewsbury.

On December 31st, at Holy Trinity, Sloane Street, WILLIAM MONSELL TAIT, R.N.A.S., was married to SYBIL MARGARET SPARKES.

To be Married.

The bethrothal is announced of Captain GERALD ALLEN, the Connaught Rangers (major R.F.C.) and MINA, only daughter of Brigadier-General Sir Owen and Lady THOMAS, of Anglesey.

The engagement is announced between Lieutenant HUGH C. BANKART, Middlesex Regiment and R.F.C., eldest son of Mr. and Mrs. George Bankart, of 37, Old Deer Park Gardens, Richmond, Surrey, and LILIAN WINIFRED, elder daughter of Mr. and Mrs. H. A. CROOK, of Brockley, S.E.

The engagement is announced of Captain BRIAN CHARLES O'DRISCOLL DOUGLAS, Connaught Rangers and R.F.C., only son of Mr. and Mrs. James Douglas, of 96, Inverness Terrace, Hyde Park, and Miss WINIFRED KATHLEEN GAMBLE, second daughter of Mr. and Mrs. Henry Gamble, of Sutton Lodge, Cookham, Berks, and Rainhill, Lancashire, and granddaughter of the late Sir David Gamble, Bt., K.C.B., of St. Helens, Lancashire.

The engagement is announced between Lieutenant ARTHUR BOWDEN PETERS, R.F.C., and STELLA KATHLEEN, second daughter of Mr. and Mrs. G. NASH, of Lyndhurst, St. Brannock's Road, Ilfracombe.

The marriage of Lieutenant WALTER H. PULLEN, R.F.C., and Miss CONSTANCE BORRETT will take place at All Saints' Church, Reading, on January 5th, at 2.15.

The engagement is announced, and the marriage will shortly take place, between Captain FRANK P. SCOTT, Yeomanry and R.F.C., and OSYTH, youngest child of the late William G. E. HERVEY and Mrs. Hervey, of Selborne, Hants, and granddaughter of the late Lord Charles and Lady Harriet Hervey.

Items.

Among the new Privy Councillors included in the New Year Honours is Lord HUGH CECIL, M.P. for Oxford University, who, it will be remembered, holds a Lieutenant's commission in the R.F.C.

Two interesting items are to hand. To Flight-Commander F. WARREN MERRIAM, R.N.A.S., and Mrs. MERRIAM, a daughter was born on December 23rd; while Mr. and Mrs. T. KEMP-WALTON were similarly blessed on December 27th.

Mr. T. B. Middleton, of Shankill, Co. Dublin, has received news that the following airmen, including his son, reported missing, are prisoners in Germany, and are not wounded:—Lieutenant A. F. Goodchap, Lieutenant. A. H. Middleton, Lieutenant Wingard George G. Peterson, and Lieutenant Stanley Grove Spiro, all of the R.F.C.

The will of MR. GEORGE JOHN STEVENS, of Russell Square Mansions, and of Athens, journalist, who represented the *Daily Chronicle* in the war between Greece and Turkey and in the Balkan War, and, in 1912, was appointed Athens correspondent of the *Daily Telegraph*, and, since 1914, war correspondent, who was killed in an air raid on September 24th, has been proved at £3,605.

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QUESTIONS IN PARLIAMENT.

Boys for the R.F.C.

MR. SNOWDEN, in the House of Commons on December 20th, asked what is the position of boys of fifteen who are being placed by Employment Exchanges in the workshops of the Royal Flying Corps; whether these boys are asked to enlist for four years with the colours and four years with the reserve, and at what age this term of enlistment begins; and under whose jurisdiction are they from the age of fifteen to eighteen?

Mr. Macpherson: The boys are placed as boy artificers in the workshops of the Royal Flying Corps, and are under the control of the Army Council. They are enlisted for either the normal period of service, in which case their term of service begins on their attaining the age of 18 years, or for the duration of the war only. The boys attest voluntarily with the written consent of their parents. After enlistment they are subject to Army discipline. I may add that the welfare of these boys is taken into special consideration, and that we should be happy to show any member the training camp.

Factory Sites at Dublin.

MR. BYRNE asked the Parliamentary Secretary to the Air Board if the Secretary of State (Air Services) has had his attention drawn to the special suitability of the county of Dublin as the location for a national aircraft factory, suitable sites and an ample supply of labour and raw materials being locally available, and local manufacturers having offered to build the necessary aircraft engines; and whether, under these circumstances, the Ministry will at once issue instructions for the establishment of a national aircraft factory in Dublin?

Sir L. Worthington Evans (Joint Parliamentary Secretary to the Ministry of Munitions): I have been asked to answer this question. An investigation is now being conducted into the suitability of Dublin as a centre for aircraft construction.

Transfers to the Air Service.

GENERAL M'CALMONT asked the Parliamentary Secretary to the Air Board whether steps are being taken to ensure that vacancies in the Air Service for work which can be performed by partially fit or over military age men will not be filled by the enlistment or transfer from the Navy or Army of men of any rank who are fit for general service, except such as have special technical qualifications?

The Parliamentary Secretary to the Air Board (Major Baird): The formation of the Air Force will be effected with the fullest regard to the considerations referred to in my hon. and gallant friend's question.

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The Artificial Seasoning of Wood.

THIS is the title of a paper which is to be read by Professor Groom before the Institution of Automobile Engineers, on Wednesday, January 9th, at the Royal Society of Arts, John Street, Adelphi. The meeting will start at 8 p.m., and anyone interested can obtain tickets from the Hon. Secretary, I.A.E., 28, Victoria Street, S.W. 1.

A British Apology to Holland.

AN official statement issued at the Hague on December 28th by the Dutch Minister for Foreign Affairs announced that the British Government had apologised for the violation of Dutch territory in the neighbourhood of Breskens (province of Zeeland) by seven British aeroplanes, and adding that the British Government had given "special and emphatic orders to all British naval air forces to avoid Dutch territory in future."

Another Zeppelin Down.

MESSAGES received in Copenhagen on December 29th from West Jutland stated that a Zeppelin was observed in flames a long distance away over the North Sea, and shortly afterwards was seen to fall into the sea. The airship was apparently accompanied by two seaplanes, of which one was subsequently seen to be in a wrecked condition and obtaining assistance from the other.

Seaplane *v.* U-Boat.

ACCORDING to a semi-official German *communiqué*, a U-boat was recently pursued by two seaplanes in the English Channel from noon to evening, and was pelted with 23 water-bombs. A few days later the same submarine, operating in the Irish Sea, was hunted by several destroyers, which within a few minutes discharged 30 water-bombs.

A Protest by the Pope.

IT was semi-officially announced at the Vatican on Monday that the Pope had sent a protest to Vienna against the destruction of two monumental churches at Padua by enemy aeroplanes. He has also drawn the attention of the Emperor Charles to the matter. He exhorts the Central Powers to abstain in future from such methods of warfare, which, while they result in no material advantage from the war point of view, make innocent victims and do damage to churches, monuments, and other precious works of art. Consequently these raids cannot be justified on the ground of international law.

Famous French Pilot Killed.

THE French Air Service has lost another noted pilot in Captain de la Tour, who, it became known in Paris on December 20, was accidentally killed when leaving an aerodrome during a fog. He had accounted for 11 enemy aeroplanes.

SIDE-WINDS.

ONE of the most interesting items in the Christmas number of the *Joystick*, which is full of good things, is The Future, by A. V. Roe. It is really sound common sense, put forward in the common-sense way, for the understanding of the most dense. Mr. Roe points out that in the heart of the people there must be a feeling and a desire for fair play, and he says: "Why not let 'Fair play' be your motto, and go straight for the right and obvious thing?" As one example of the sound philosophy, the following may be quoted:—"For instance, if in America a bricklayer lays 2,000 bricks a day, and the British bricklayer's union will not allow him to lay more than 1,000, who is the gainer? Nobody. It is an all-round loss to the bricklayer, the employer, and the public. It means that you have to pay higher rents, and when this method is carried on right through the whole industrial life it means that we are all cutting each other's throats."

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£8 6s. 8d. per bottle for a case of twelve bottles of whisky surely creates a new record in prices even in these days of high prices and scarcity. Yet a number of public spirited men have recently paid this price for a case of Haig & Haig. This is how it happened. An offer was made on December 4th of a limited number of cases of this famous whisky at £100 per case, with the undertaking that War Bonds would be purchased and handed over to a charity fund. Many patriotic gentlemen have responded and have paid this record price stated above. War Bonds have been purchased, and various charities have considerably benefited.

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BURBERRYS announce, for their 1918 sale, which commenced January 1st, that goods cannot be sent on approval, as the Ministry of Labour requires that, wherever possible, labour should be saved.

Forwarding goods on approval entails an enormous amount of work on post office, railway staffs and all concerned, and Burberrys' patriotic decision to avoid this extra labour is to be recommended. A personal visit is therefore requested.

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OWING to the increase in price of raw material, Messrs. Accles and Pollock, Ltd., have found it necessary to advance all spanner prices to fifty per cent. on published lists, instead of the sixteen and two-thirds per cent. pertaining recently. They regret this necessity, but it is obvious to everyone connected with the trade that present circumstances make it essential. Details of the new prices will be sent to all traders on application to the firm at Oldbury, Birmingham.

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MR. H. M. THORNTON, M.I.M.E., the managing director of the Richmond Gas Stove and Meter Co., Ltd., Furnace and Industrial Engineers, has been elected an associate of the Institution of Civil Engineers.

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IT is not surprising that the utility and novelty of the Lazilite fitting which was illustrated in our last issue has aroused a good deal of interest among those who realise the supreme importance of efficient lighting. It should be noted that the Lazilite Co., of 5, Baldwins Gardens, Gray's Inn Road, E.C., are at all times willing to place their experience freely at the disposal of anyone who are considering lighting installation.

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TO each business and profession its own jargon. The starch trade talks seriously of "twaddle," engineers grow eloquent on "amps" and "revs," the advertisers have much enthusiasm for "slogans," a subject most engineers know nothing of. The Pulvo people do, though and their little slogan "what Pulvo promises Pulvo performs" strikes us as both an excellent slogan and an excellent business motto.

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CONSEQUENT upon the removal of the Experimental, Research and Patent Departments from the Curtiss Aeroplane and Motor Corporation, Buffalo, New York, to the Curtiss Engineering Corporation, Garden City, Long Island, communications intended for Mr. Glenn H. Curtiss and for the departments mentioned should be addressed to Curtiss Engineering Corporation, Garden City, Long Island, New York. Phone, Garden City 1580.

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WE are informed that the business of L. Blériot-Aeronautics has been acquired by the Air Navigation Co., Ltd., and that the business will be conducted under that style as from January 1st, 1918. There will be no change in the Management and Staff.

COMPANY MATTERS.

Triplex Safety Glass Co., Ltd.

THE report of the directors for the year ended November 30th, 1917, which was passed at the company's meeting on December 31st, states that the total capital authorised has now been issued, which has enabled the company to discharge their mortgage liabilities and to provide the additional working capital which their extended business requires. With regard to the year's trading, the result is a net profit of £20,133 7s. 1d. With this sum it is proposed to write off a further £2,000 from development account, also depreciation amounting to £249 14s. 3d., leaving £17,883 12s. 10d., and making, with the balance brought forward of £257 15s. 4d., a total of £18,141 8s. 2d. An interim dividend of 4 per cent. was paid on July 14th last, which absorbed £2,039 7s. 3d. The directors recommended a final dividend of 6 per cent., making a dividend of 10 per cent. for the year, absorbing £3,600, and leaving a balance to be carried forward of £12,502 0s. 11d. to cover excess profits duties and other contingencies. During the period under consideration the company has disposed of their Canadian rights to a syndicate in New York for a cash consideration and an interest in a new company about to be formed there.

White and Poppe.

DIRECTORS are unable to present the accounts for year ending July 31st, 1917, owing to the amount of taxation payable under the Munitions of War Act and the Finance Act being still unascertained. They recommend a dividend of 15 per cent. on ordinary shares (subject to tax), against same being satisfied, under the report of the company's auditors, that there are sufficient profits available for this purpose, after making all necessary provisions.

NEW COMPANIES REGISTERED.

PRIORS AERIAL PATENTS, LTD.—Capital £50,000, in £1 shares. Acquiring the benefit of certain applications for patents, &c.

RELIANCE AIRSCREW, LTD., 11-12, Leeds Place, Tollington Park, N.—Capital £1,000, in £1 shares. Acquiring business carried on at Leeds Place, Tollington Park, London, as the "Reliance Airscrew Co.," manufacturers of and dealers in aircraft propellers, parts and accessories, &c. First directors are:—A. Renn, E. Burrows, W. F. Hawkes and G. Mackenzie.

WHITEMAN MANUFACTURING CO., LTD., 15 Bateman Street S.W.—Capital £7,000, in 3,000 7½ per cent. cum. pref. and 3,000 preferred ordinary shares of £1 each and 10,000 deferred shares of 2s. each. Manufacturers of and dealers in aeroplanes, airships, life-saving devices, &c. First directors J. B. Taunton and G. E. De Brunner, H. M. Leach and H. W. Copping.

Aeronautical Patents Published.

Applied for in 1916.

The numbers in brackets are those under which the specifications will be printed and abridged, &c.
Published January 3rd, 1918.

15,631. E. V. HAMMOND. Variable wing surfaces for aeroplanes. (111,691).
7,375. C. W. CROSSLEY. Rotary engines or turbines. (111,700).

Applied for in 1917.

The numbers in brackets are those under which the specifications will be printed and abridged, &c.
Published January 3rd, 1918.

594. E. WILKINSON. Hydro-aeroplanes. (111,747).
7,158. A. W. MYERS AND R. R. FITZGERALD. Parachute attachments. (111,802).

FLIGHT
and The Aircraft Engineer.
36, GREAT QUEEN STREET, KINGSWAY, W.C. 2.
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

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